INVENTORY OF RESEARCH PROJECTS 1982 - 83

F.Y. 1982/1983

INVENTORY OF RESEARCH PROJECTS

TABLE OF CONTENTS

	Page No.
Preface	1
Introduction and Explanation	2
Format of F.Y. 1982/1983 Inventory	3
Research Advisory Committee	4
Breakdown of the Research Projects According to Time Duration	5
List of Projects	
Air Resources Branch	AR-1 to AR-20
Acid Precipitation in Ontario Study	Included in Air and Water Resources Branches
Hazardous Contaminants Office	See Bottom of Page 2
Laboratory Services & Applied Research Branch	LS-1 to LS-82
Pesticides Advisory Committee	PAC-1 to PAC-28
Pollution Control Branch	Integrated with Laboratory Services Branch
Provincial Lottery Research Projects	PL-1 to PL-20
Waste Management Advisory Board	WMAB-1 to WMAB-4
Waste Management Branch	WM-1 to WM-10
Water Resources Branch	WR-1 to WR-37
INDEX	

PREFACE

The Inventory of Research Projects is produced by the Research Advisory Committee with the assistance of staff of the Development and Research Group. Any questions concerning specific projects should be addressed to the Director of the Branch which initiated the study.

P. D. Foley
Chairman, Research Advisory Committee
Pollution Control Branch

INTRODUCTION AND EXPLANATION

ORIGIN

The Ministry of the Environment first published an Inventory of Research and Development projects in June, 1973. The publication was initiated by the Deputy Minister who recognized the need for a comprehensive list of research and development projects which would be readily available. The initial Inventory was prepared by the Strategic Planning Branch. The Research Advisory Committee was appointed in 1975 and is now responsible for the preparation of the Inventory.

PURPOSE

The purpose of the Inventory is to promote the communication of the Ministry of the Environment's activities to the research community, and to facilitate a more efficient use of capital and human resources devoted to environmental research. It is hoped that the information contained here will assist those currently conducting studies, by providing them with access to projects in this Ministry which are related to their own. Another major objective is to foster co-operative efforts and prevent the duplication of programs, particularly among Ministries of the Ontario Government. Ultimately, the Inventory will provide a comprehensive background for the review of environmental research priorities, revealing those areas which are already being extensively examined, and those which demand increased attention.

ORGANIZATION OF THE INVENTORY

The Inventory consists of profiles of the individual research projects being conducted by each Branch of the Ministry in the 1982/83 fiscal year, as they were identified by the Branches themselves. It includes in-house activity, as well as research generated by grants to Universities, contract research and projects supported by joint funding with others.

The Inventory includes:

(1) all projects conducted outside the Ministry, through Ministry of the Environment funding; including use of Provincial Lottery Trust Funds;

(2) all major research carried out on an in-house basis by the Ministry's Branches.

It is outside the objectives of the Inventory to include the routine test series and studies which implement on-going management programs.

In the case of Projects funded in FY 82/83 by the Provincial Lottery Trust Fund they are shown in sequence on the pages marked "PL". These same projects are also shown in some instances on the sheets from the respective Branch supervising the Lottery Project but are marked accordingly.

This Inventory lists Ministry of the Environment Research Projects for FY 82/83 undertaken up-to-date October 1, 1982.

The Hazardous Contaminants Program (11 Projects) was approved on November 3, 1982 and the Index does not contain reference to this program.

FORMAT OF FY 82/83 INVENTORY

The projects are grouped under their funding Branches, Boards or Committees. The profiles supply the following information:

Branch	Ministry branch responsible for the project and who should be contacted for further information.
Project Title	For identification and filing.
Key Words	Key words relating to each project are listed alphabetically in the Index at the back of the Inventory.
Principal Investigator	Contact source for additional information on project.
Liaison Officer Supervisor or/ Senior Ministry Official	Shows the Ministry of the Environment personnel responsible for the project.
Research Category	Identifies whether work is done in Ministry (internal) or outside (grant or a solicited or unsolicited contract) and if project is multi-year.
Objective	Immediate reasons for undertaking the project.
Description	Details of the projects focuses on the methodology employed and indicates the exact nature of the research to persons with expertise in the field.
Duration of Projects in Years	Starting and completion dates.
Budget	Current year total dollars and man years for the project. These are estimates made prior to start of the project.
Source of Funds	Projects in the regular work program are funded out of normal branch budgets, those in the special category use funds set up particularly for the project and are identifiable in the Ministry budget. Most of the jointly funded projects are federal-provincial programs such as those of the International Joint Commission and the Canada/Ontario Agreement for Water Quality in the Great Lakes. The Provincial Lottery funds support various projects that in some cases are jointly funded with the Federal Government or others.

Reporting Procedure	Whether there will be interim and/or final reports available; and when anticipated.
Participation by Other Ministries	This space indicates if the project is assisted from other Provincial Ministries by either funding, equipment or staff support.
Remarks	Special comments on the project not listed above are shown here.

RESEARCH ADVISORY COMMITTEE

The Research Advisory Committee (RAC) was created in 1975 to provide a broadly based co-ordinating and planning group for the Ministry's research program. The committee is made up of representatives of the various Ministry Branches who have research responsibilities plus a member from the Program Planning & Evaluation Branch, a representative from the Regional Offices and a medical advisor from the Ministry of Labour.

The Research Advisory Committee is also responsible for the administration of the Provincial Lottery Trust Fund which is available for health-oriented environmental projects. Twenty (20) projects are being funded in 1982/83 at a budget of $846,800. All of these projects are research oriented and are included in this summary. One of the responsibilities of the RAC is the annual publication of the Inventory of Research Projects.

Comparison of FY 77/78, FY 78/79, FY 79/80, FY 80/81 and FY 81/82
Projects with FY 82/83 Research Projects
According to Time Duration

	FY77/78	FY78/79	FY79/80	FY80/81	FY81/82	FY82/83
Projects in their first year	58	60	69	75	91	81
Projects in their second year	25	36	59	56	51	55
Projects in their third year	23	18	23	25	29	31
Projects in their fourth year	9	9	19	12	5	7
Projects existing for five years or longer	25	18	13	12	19	23
Total Research Projects	140	141	183	180	195	197
Projects conducted within the Ministry of the Environment	85	63	102	103	101	105
Projects conducted by Outside Contracts at Universities and Consultants	55	78	81	77	94	92

LIST OF PROJECTS

	Page No.
AIR RESOURCES BRANCH	
Production of Ozone Insensitive Field Bean Varieties	AR-1
Chemical Speciation of Airborne Particulate Matter	AR-2
Laser Induced Emission Spectroscopy of Polycyclic Aromatic Hydrocarbons in Low Temperature Matrices	AR-3
Aerosol Analysis System	AR-4
Development of a Strategy for Predicting the Impact of Fast Food Restaurants on the Surrounding Community	AR-5
Assessment of Impact of Oxidant Injury on Potato and on the Development of Early Blight	AR-6
Synthesis of Polynuclear Aromatic Hydrocarbons of Interest in Environmental Pollution	AR-7
Long and Short Term Studies of Airborne Pollutants	AR-8
Evaluation of Contaminated Water and Soil Sites as Sources of Airborne Hazardous Materials	AR-9
Long-range Transport of Aerosols from Satellite Imagery	AR-10
Sweet Corn and Green Bean Response to Air Pollution in Southern Ontario	AR-11
Methods for the Sampling and Analysis of Nitro-Substituted Polycyclic Aromatic Hydrocarbons	AR-12
Provision of PAHs and Aza-PAHs as Environmental Analytical Standards	AR-13
Acid Precipitation Estimation by Indicating Ion Exchange	AR-14
Multielement Determination of Metals and Metal Compounds in Air and Related Samples	AR-15
Methods for Sampling and Analysis of Asbestos Air Pollution in Ontario	AR-16
Characterization of Airborne Particulate Matter	AR-17
Organic Airborne Particulate Matter	AR-18
Organic Vapour Sampling	AR-19
Trace Organic Contaminants	AR-20

LABORATORY SERVICES AND APPLIED RESEARCH BRANCH

	Page No.
Nitrification-Denitrification for the Control of Ammonia and Hydrogen Sulfide in Lagoon Effluents	LS-1
Phosphorus Removal from Secondary Effluents	LS-2
To Determine the Average Unit Process Operating Costs in Several WPCP's	LS-3
Conservation of Nitrogen in Aerated Holding Tanks and Aerobic Digester Sludges	LS-4
Full-Scale Anaerobic Digester Mixing Optimization and Loading Studies	LS-5
To Investigate the Costs and Maintenance Required to Operate a Full-Scale Chlorination-Dechlorination System	LS-6
Nitrification-Denitrification for the Control of Ammonia and Hydrogen Sulfide in Lagoon Effluents	LS-7
Magnetic Treatment in Water Purification	LS-8
Manganese Removal from Surface Water	LS-9
Asbestos in Potable Water Supplies	LS-10
Iron Sequestration	LS-11
Manganese Sequestration	LS-12
Trace Contaminants in Water Treatment Plant Chemicals	LS-13
Distribution System - Small Animal Survey	LS-14
Trihalomethane Levels in Ontario Drinking Waters	LS-15
Asbestos Cement (A/C) Pipe Corrosion	LS-16
The Occurrence of Yersinia Enterocolitica in Selected Raw and Treated Drinking Waters in Ontario	LS-17
A Survey of Water Quality in Distribution Systems	LS-18
Organic Removal at the Niagara Falls Water Treatment Plant	LS-19
Ozonation of Potable Water Supplies	LS-20
Ozone as an Alternative to Chlorination for Drinking Water Disinfection	LS-21
The Effect of Hydraulic Characteristics and Effluent Chlorination on the Incidence of Microorganisms of Public Health Significance in Receiving Waters	LS-22

	Page No.
Organic Removal through Conventional Water Treatment Processes	LS-23
Screening for Priority Organic Contaminants and Heavy Metals in Digested Municipal Sludges	LS-24
UV Disinfection of Secondary Effluent	LS-25
The Applicability of UV Disinfection Technology in Ontario Wastewater Treatment Plants	LS-26
Formation of Chlorinated Organics during Disinfection of Secondary Effluent	LS-27
Evaluation of Field Test Kits	LS-28
Kennedy-Burnett Urban Stormwater Runoff Treatment Study (Part of the Rideau River Study)	LS-29
Assessment and Modelling of I/I Flows in Stratford	LS-30
Characterization of Runoff Quantity/Quality Relationships - Taylor Creek	LS-31
Assessment of Stormwater Detention Ponds	LS-32
Analysis and Control of Large Combined Sewer Systems	LS-33
Design Procedures for Stormwater Ponds used for Control of Runoff Quality	LS-34
Investigations of Persistent Toxic Substances in Urban Runoff Draining into the Niagara River	LS-35
Hazardous Contaminants in Hamilton WPCP	LS-36
Evaluation of the Virucidal Efficiency of an Ultra-violet Disinfection Process at the Tillsonburg STP	LS-37
Development of Quantitative Assay for the Recovery of Enteric Viruses	LS-38
Evaluation of Secondary Concentration Methods for the Recovery of Enteric Viruses from Environmental Samples	LS-39
One-Step Fecal Coliform Isolation and Enumeration	LS-40
U.V. Disinfection Study - Microbiological Aspects	LS-41
Evaluation of Microdiffusion Technique for the Extraction of Fluoride from Vegetation and Soil	LS-42
Determination of Cyanide Species by Ion Chromatography and Electrochemical and Conductometric Detection	LS-43

	Page No.
Determination of Thallium in Environmental Samples by Differential Pulse Anodic Stripping Voltammetry (DPASV)	LS-44
Characterization of Urban Air Particulate Matter in Hamilton	LS-45
Determination of Nickel and Cobalt by Differential Pulse Polarography in Atmospheric Precipitation	LS-46
Adaptation of Hydride AA-system for the Arsenic Determination of ppb Amounts of Mercury	LS-47
Determination of Mercury by Cold Vapour Non-dispersive Atomic Fluorescence Spectrometry	LS-48
Development of Microcomputer for Interface with L.I.S. and Local Data Manipulation on I.C.P. Spectrometer	LS-49
Development of Two Monochromators to be added to an Emission Polychromator	LS-50
Development of an Energy Dispersive XRF Method for Air Particulate Analysis	LS-51
An Analytical Procedure for Organic Carbon in Waters which may or may not contain Suspended Solids	LS-52
Acidity Component Fractionation	LS-53
Asbestos Leaching in AC Pipes	LS-54
Asbestos Sample Stability and Accuracy of the Interim Method for the Determination of Asbestos Fibre Concentrations in Water by Transmission Electron Microscopy	LS-55
The Development of Analytical Techniques for the Characterization and Quanitation of Synthetic and Naturally Occuring Mineral Fibres in Ontario (excluding Asbestos)	LS-56
Controller for an Automated Ion Chromatograph System	LS-57
Construction of a Microprocessor Controlled Ion Chromatograph	LS-58
Determination of Bromide by Ion Chromatography	LS-59
An In-depth Review of the Entire Chlorophyll Procedure	LS-60
Investigation of Flow Injection Analysis (FIA) Systems and Methods	LS-61
Phenols: Recovery and Efficiency of Existing 4-AAP Method	LS-62

	Page No.
Biological Oxygen Demand Measurements	LS-63
Automated Procedure for the Determination of True Colour in Hazen Units	LS-64
Low Level Fluoride Measurement by Ion Specific Electrode	LS-65
The Development and Implementation of a Method and Quality Control Procedure for the Analysis of Tritium in Drinking Water	LS-66
The Development and Implementation of a Method and Quality Control Procedure for the Analysis of Lead-210 in Sediments	LS-67
High-performance Liquid Chromatographic Analysis of Polar Pesticides and Metabolites	LS-68
Use of Automated Clean-up System for PCB Analysis in Fish	LS-69
Development of Analytical Methodology for Analysis of Chlorodibenzofurans and Dioxins in Environmental Samples	LS-70
Development of High Resolution Capillary G.C. Methodology for the Analysis of Chlorinated Industrial Organics	LS-71
Evaluation of Capillary GC for Routine Fish Contamination Monitoring	LS-72
Multi-component Cartridges for Sampling and Analysis of Trace Organics in Air	LS-73
Extension of HCl Digestion/Extraction of Fish Tissues for the Analysis of Organic Pollutants	LS-74
Investigation of the Seasonal Variation of PCB and Organochlorines in Lake Ontario Lake Trout	LS-75
Occurrence of PCDDS/PCDFS in Incineration Source Samples	LS-76
A Novel Extraction Technique for Priority Pollutants Utilizing Very Small Quantities of Solvents	LS-77
The Use of the Kenics Mixer in Fast Analytical Extractions	LS-78
Automated Extraction of Water Samples for the Analysis of Priority Pollutants	LS-79
Design of a Continuous Purging Apparatus for the Concentration of Malodorous Organics in Water	LS-80

	Page No.
Development of Novel Techniques for the Quantitative Recovery of Priority Pollutants from Solvent Extracts	LS-81
A Novel Field Sampler for Atmospheric Pollutants	LS-82
PESTICIDES ADVISORY COMMITTEE	
Smut of Fall Panicum	PAC-1
The Separate Metering of Herbicides and Water to a Controlled Droplet Applicator	PAC-2
Integrated Management of Snow Mold Diseases of Turfgrasses	PAC-3
Monitoring Dormant Seeds in the Soil to Predict Weed Infestations and Herbicide Needs the Following Year	PAC-4
Behaviour of Aldicarb (Temik$^{(R)}$) in Soil	PAC-5
Dislodgeable Pesticide Residues on Turfgreen Foliage in Relation to Safe Re-entry	PAC-6
Weed Monitoring Techniques for the Detection of Specific Periods of Crop Interference to Reduce or Eliminate Herbicide Usage	PAC-7
Determination of the Cause of Poor Efficacy of Insecticides Used for Control of Rootworms	PAC-8
Evaluating *Beauveria bassiana* for Biological Control of Seed and Cone Insects in White Spruce	PAC-9
Feasibility of Using the Egg Parasite, *Trichogramma minutum* Riley, for Biological Control of the Spruce Budworm, *Choristoneura fumiferana* (Clemens)	PAC-10
Evaluation of Sublethal Effects of Pesticides under Natural and Laboratory Conditions	PAC-11
The Assessment of the Hazards of Formulations of Sevin (carbaryl) to Honeybees, Other Pollinators, and Floral Resources in Ontario	PAC-12
Development of a Technique for Monitoring the Variegated Cutworm in Tomatoes in Essex and Kent Counties to Reduce Pesticide Damage	PAC-13
Biology and Control of Thrips on Cabbage	PAC-14
Losses in Production of Potatoes, Rutabagas, and Onions Attributable to Insects, Diseases and Weeds	PAC-15
Development of an Acceptable Procedure to Allow Disposal of Pesticide Containers	PAC-16

	Page No.
Development of Sex Attractant Traps for Monitoring Changes in Low Density Spruce Budworm Populations as a Means of Implementing Early Intervention Management Strategies	PAC-17
Meadow Mouse Control in Orchards	PAC-18
Study of the Herbicidal Properties and Environmental Fate of Trichlopyr	PAC-19
The Biology and Control of Mosquitoes and Other Biting Flies in Ontario	PAC-20
Weather-timed Fungicide Schemes for Vegetable Crops	PAC-21
Feasibility of Using Parasites and/or Predators in a Program of Integrated Control of the Onion Maggot	PAC-22
Influence of Environmental Factors on the Rate of Microbial Degradation of Pesticides in Soil	PAC-23
Integrated Pest Management in Ontario	PAC-24
Efficacy of Alternative Herbicides to Improve Onion Establishment on Muck Soils, as a Substitute for the Loss of Allidichlor	PAC-25
Factors Affecting the Efficacy of Sprays to Control White Mold on White Bean	PAC-26
Evaluation of Adult and Larval Mosquito Sampling Techniques in Ontario	PAC-27
The Residues of Metalaxyl in Tobacco Plants, Soils and in the Watershed	PAC-28

PROVINCIAL LOTTERY TRUST FUND PROJECTS

Development of an Experimental Marsh Treatment Facility at Listowel, Ontario	PL-1
The Study of Gas Production and Migration at Closed Landfill Sites	PL-2
Ozone Application as an Alternative to Chlorine for Drinking Water Disinfection	PL-3
Effect of Hydraulic Characteristics and Effluent Chlorination on the Incidence of Microorganisms of Public Health Significance in Receiving Waters	PL-4
Characterization and Identification of Organic Substances in Drinking Water	PL-5

	Page No.
A Study to Evaluate Urban Road Dust as a Source of Suspended Particulates	PL-6
Rideau River Storm Water Management Study, Ottawa, Ontario	PL-7
Assessment of Human Exposure to Air Pollution	PL-8
Development of Non-Chemical Approaches to Pest Control (Sterile Male Onion Maggot Technique)	PL-9
Attenuation in Ground Water of Inorganic Contaminants from Sanitary Landfills on Sandy Unconfined Aquifers	PL-10
Investigation of Sleep Disturbance Effects of Road Traffic Noise	PL-11
Aquatic Toxicity Studies of Multiple Organic Compounds	PL-12
Expenses of Provincial Lottery Technology Transfer	PL-13
A New Potable Water Treatment Method for Trihalomethane Precursor and Synthetic Organic Removal	PL-14
Application of Ultra Violet Disinfection Technology in Ontario WPCP Effluents	PL-15
Chemical Identification and Biological Assay Studies of Environmental Mutagens, Promoters and Inhibitors	PL-16
Controlling Sulphur Dioxide Emissions	PL-17
Environmental Significance of Sewage Lagoons in Ontario	PL-18
Field Measurements Infiltration through Landfill Covers	PL-19
Literature Searches Regarding the Potential Genotoxic Hazards of Specific Environmental Contaminants	PL-20

WASTE MANAGEMENT ADVISORY BOARD

Economic Benefits of Materials Recycling	WMAB-1
Public Involvement in Environmental Planning, Assessment and Decision-Making	WMAB-2
A Study to Determine the Protection by Various Packaging Materials with respect to the Deleterious Effect of Light on Milk	WMAB-3
Development and Demonstration of an Effective Waste Reduction Program	WMAB-4

Page No.

WASTE MANAGEMENT BRANCH

Foliar and Soil Analysis of Potting Soils Amended with Compost from the E.R.R.P. (Follow-up to the Completed Study "Compost as a Media Amendment for Container Production.") WM-1

Survey of Conventionally Non-reputable High Grade Waste Paper Fibre in Relation to Availability, Economics of Reclamation and Energy Requirements WM-2

Compost - An Evaluation of its Use in Container Growing and Field Production for Landscape Trees and Shrubs WM-3

Compost Utilization WM-4

North York Source Separation Feasibility Study WM-5

Experimental Plant for Resource Recovery WM-6

Best Pipe WM-7

Gas Migration Study WM-8

Remote Sensing Techniques and Waste Management Assessment Study WM-9

Study on Landfill Research Activities WM-10

WATER RESOURCES BRANCH

Hydrogeologic Mapping WR-1

Evaluation of the Long Term Impact of Pollutants in Ground Water WR-2

Ground Water Quality in Ontario WR-3

APIOS Ground Water Studies WR-4

Field Measurement of Infiltration through Landfill Covers WR-5

Application of Geophysical Techniques to Ground Water Studies WR-6

Drainage Basin Inventory Studies WR-7

Surface Water Quality Management (Water Quality Flagging) WR-8

Ontario Experimental Neutralization Study WR-9

Acidic Precipitation in Ontario Study WR-10

	Page No.
Marshland Projects	WR-11
(1) Urban Lakes; (2) Lake Restoration	WR-12
Phosphorus Removal Studies	WR-13
Lower Holland River, Phosphorus Regeneration Study	WR-14
Taxonomy and Ecology of Phytoplankton in Lake Acidification, Neutralization and Eutrophication Studies	WR-15
Filamentous Algae Program	WR-16
Algal Assay Methods to Determine Toxicity of Natural Water in Ecosystems	WR-17
Lake Superior Pulp and Paper Effluent Characterization	WR-18
Nanticoke Environmental Study - Phytoplankton Program	WR-19
Bay of Quinte - Inorganic and Organic Contaminants	WR-20
Toronto Waterfront Circulation	WR-21
Toronto Waterfront - Sediment Quality Assessment	WR-22
Nearshore Cladophora Contaminant Monitoring - Lake Ontario and Niagara River	WR-23
Toronto Waterfront Bioaccumulation	WR-24
Nanticoke	WR-25
Lake Ontario - Port Hope	WR-26
Hamilton Harbour - Effect of Hamilton Harbour on Nearshore Lake Ontario	WR-27
Biomonitoring of the St. Clair System and Detroit River	WR-28
Toronto Waterfront - Effects of Dredging/Lakefilling Activities	WR-29
Effects of Depressed pH on Brook Trout Reproductive Physiology	WR-30
Nearshore Fish Contaminants Surveillance - Great Lakes	WR-31
Fish Contaminant Investigations in Acid Sensitive Ontario Lakes	WR-32
Development of a Freshwater Fish Test to Identify Aquatic Genotoxic Contaminants	WR-33

	Page No.
Toxicity of Multiple Organics	WR-34
Fish Interspecies Comparison of Sensitivity to Episodic Depressed pH Stream Conditions	WR-35
Effects of Depressed pH and Elevated Aluminum on Fish Respiration Physiology	WR-36
Fish Interspecies Comparison of Sensitivity to Depressed pH and Aluminum	WR-37

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1982

PROJECT TITLE: Production of ozone insensitive field bean varieties

KEY WORDS: Phytotoxicology, ozone, beans

PRINCIPAL INVESTIGATOR AND AFFILIATION: Profs. W.D. Beversdorf, & B.D. McKersie, University of Guelph

LIAISON OFFICER OR SUPERVISOR: R. Pearson

RESEARCH CATEGORY:
INTERNAL —— GRANT —X
UNSOLICITED CONTRACT —— SOLICITED CONTRACT ——
MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:

To generate basic plant population for ozone resistant white beans.

DESCRIPTION:

The ozone tolerance of specific bean populations will be measured and the capability for transferring tolerance characteristics to Ontario field beans will be investigated.

DURATION OF PROJECT: 3 YEARS

PRESENT YEAR IS: 3rd YEAR

REPORTING DATE: annual

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
39,292	14,602	3	1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:

NO

REMARKS:

Ministry of the Environment
Ontario

AR-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1982

PROJECT TITLE: Chemical speciation of airborne particulate matter

KEY WORDS: Analysis, APM, Neutron Activation

PRINCIPAL INVESTIGATOR AND AFFILIATION: Professor D. Burgess, McMaster University

LIAISON OFFICER OR SUPERVISOR: B. Loescher

RESEARCH CATEGORY:
INTERNAL GRANT — X
UNSOLICITED CONTRACT —
SOLICITED CONTRACT —
MULTI-YEAR PROJECT —
CONCURRENT PROJECT —

OBJECTIVE:

To develop procedures for the determination of the chemical compositon of airborne particulate matter using volatilization and neutron activation analysis.

DESCRIPTION:

A procedure for the optimization of multielement neutron activation analysis and the conditions required for selective volatilization of compounds of interest will be studied.

DURATION OF PROJECT: 3 *YEARS*
PRESENT YEAR IS: 3rd *YEAR*
REPORTING DATE: annual

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	36,233	15,000	3	1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING —
JOINTLY FUNDED PROJECT —
OTHER —

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1982

PROJECT TITLE: Laser induced emission spectroscopy of polycyclic aromatic hydrocarbons in low temperature matrices.

KEY WORDS: PAH, analysis, method development, laser fluorescence

PRINCIPAL INVESTIGATOR AND AFFILIATION: Profs. S.V. Filseth and F.J. Morgan, York University

LIAISON OFFICER OR SUPERVISOR: O. Meresz, W.C. Tam

RESEARCH CATEGORY: INTERNAL GRANT X — UNSOLICITED CONTRACT — — MULTI-YEAR PROJECT —
SOLICITED CONTRACT — — CONCURRENT PROJECT —

OBJECTIVE:

To develop a laboratory capability to obtain laser excited fluoresence spectra of PAH's in low temperature matrices.

DESCRIPTION:

A pulsed tunable dye laser will be used to excite the fluorescence spectra of trace quantities of PAH's in alkane matrices at 10-20 K in order to make quantitative analyses of complex mixtures obtained in environmental sampling programs.

DURATION OF PROJECT: 3 YEARS — PRESENT YEAR IS: 1st YEAR — REPORTING DATE: annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	39,083	17,083	3	1

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — — JOINTLY FUNDED PROJECT — — OTHER —

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* July, 1982

PROJECT TITLE: Aerosol Analysis System

KEY WORDS: Aerosol, sampling, TAGA

PRINCIPAL INVESTIGATOR AND AFFILIATION Professor J.B. French, University of Toronto

LIAISON OFFICER OR SUPERVISOR G. De Brou

RESEARCH CATEGORY:
INTERNAL —— *GRANT* —X— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To build prototype aerosol collection and desorption systems matched to TAGA.

DESCRIPTION:

A modified virtual impactor system, will be coupled to a hot plasma vaporization source to enable real time elemental analysis to be performed on aerosols. An impactor geometry for organics will also be tested.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 3rd *YEAR* *REPORTING DATE* annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	65,823	26,358	3	1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1982

PROJECT TITLE: Development of a strategy for predicting the impact of fast food restaurants on the surrounding community.

KEY WORDS: Odour

PRINCIPAL INVESTIGATOR AND AFFILIATION: Professor A.W. Gnyp, University of Windsor

LIAISON OFFICER OR SUPERVISOR: E.T. Barrow, W. Suboch

RESEARCH CATEGORY:
INTERNAL —— GRANT —X
UNSOLICITED CONTRACT —— SOLICITED CONTRACT ——
MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:

To develop a strategy for predicting the impact of odorous pollutants from fast food restaurants.

DESCRIPTION:

Ambient and source sampling techniques will be developed and correlated with complaint potential thresholds.

DURATION OF PROJECT: 3 YEARS
PRESENT YEAR IS: 2nd YEAR
REPORTING DATE: annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	20,000	6,900	3	1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* July, 1982

PROJECT TITLE: Assessment of impact of oxidant injury on potato and on the development of early blight.

KEY WORDS: Phytotoxicology, ozone, potato

PRINCIPAL INVESTIGATOR AND AFFILIATION: Professor G. Hofstra, University of Guelph

LIAISON OFFICER OR SUPERVISOR: R. Pearson

RESEARCH CATEGORY:
INTERNAL GRANT — X
UNSOLICITED CONTRACT —
SOLICITED CONTRACT —
MULTI-YEAR PROJECT —
CONCURRENT PROJECT —

OBJECTIVE:

To increase potato yield by improving understanding of ozone damage.

DESCRIPTION:

Ozone injury to different potato cultivars will be assessed and this will be related to early blight and yield loss. Effectiveness of chemical protectants will also be studied.

DURATION OF PROJECT: 3 *YEARS* *PRESENT YEAR IS:* 3rd *YEAR* *REPORTING DATE:* annual

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
64,718	26,310	3	1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM — X
SPECIAL MINISTRY FUNDING —
JOINTLY FUNDED PROJECT —
OTHER —

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

AR-7

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1982

PROJECT TITLE: Synthesis of polynuclear aromatic hydrocarbons of interest in environmental pollution.

KEY WORDS: PAH, synthesis

PRINCIPAL INVESTIGATOR AND AFFILIATION: Professor E. Lee-Ruff, York University

LIAISON OFFICER OR SUPERVISOR: O. Meresz, Szakolcai

RESEARCH CATEGORY: INTERNAL —— GRANT —X— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:

To prepare specific PAHs of interest in environmental chemistry. Samples are to be used as standards for characterization purposes.

DESCRIPTION:

Analogues of cyclopenta (c,d) pyrene and benzo(a) pyrene are going to be prepared for characterization of possible hydrocarbon contaminants of unknown structure.

DURATION OF PROJECT: 2 YEARS

PRESENT YEAR IS: 1st YEAR

REPORTING DATE: annual

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
13,000	6,500	2	1

SOURCE OF FUNDS: REGULAR WORK PROGRAM —— SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1982

PROJECT TITLE: Long and short term studies of airborne pollutants.

KEY WORDS: Aerosol, PIXE, Elemental Analysis, Trees, Historical Pollution

PRINCIPAL INVESTIGATOR AND AFFILIATION: Professor J.D. McArthur, Queens University

LIAISON OFFICER OR SUPERVISOR: W.H. Chan, W.D. McIlveen

RESEARCH CATEGORY:
INTERNAL GRANT — X
UNSOLICITED CONTRACT —
SOLICITED CONTRACT —
MULTI-YEAR PROJECT —
CONCURRENT PROJECT —

OBJECTIVE:

To determine short (20 min.) and long (before industrial revolution) time scale variations in air pollution.

DESCRIPTION:

Proton induced x-ray emission analysis will be applied to aerosol collected on filters and to tree rings.

DURATION OF PROJECT: 3 YEARS
PRESENT YEAR IS: 2nd YEAR
REPORTING DATE: Annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	42,500	14,000	3	1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM — X
SPECIAL MINISTRY FUNDING —
JOINTLY FUNDED PROJECT —
OTHER —

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-9

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1982

PROJECT TITLE: Evaluation of contaminated water and soil sites as sources of airborne hazardous materials.

KEY WORDS: Contaminated water and soil, airborne hazardous materials

PRINCIPAL INVESTIGATOR AND AFFILIATION: Professor D. MacKay, University of Toronto

LIAISON OFFICER OR SUPERVISOR: M. Moselhy, A. Szakolcai

RESEARCH CATEGORY:
INTERNAL GRANT X
UNSOLICITED CONTRACT —— SOLICITED CONTRACT ——
MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE: To develop equations for predicting the rate of volatilization (and hence the source strength to the atmosphere) of organic pollutants which are present in dispersed source from in water bodies or in soils.

DESCRIPTION: Relevant equilibrium physical chemical properties of selected organic compounds will be measured and two small scale experimental system will be set up and operated to validate the proposed equiations and determine the binetic parameters.

DURATION OF PROJECT: 3 YEARS
PRESENT YEAR IS: 1st YEAR
REPORTING DATE: annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	51,000	17,000	3	1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* July, 1982

PROJECT TITLE: Long-range transport of aerosols from satellite imagery

KEY WORDS: Satellite, Remote Sensing, Aerosol, Long Range Transport

PRINCIPAL INVESTIGATOR AND AFFILIATION: Professor J.R. Miller, York University

LIAISON OFFICER OR SUPERVISOR: D. Yap

RESEARCH CATEGORY:
INTERNAL —— *GRANT* —X
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To derive images of aerosol movement across the Great Lakes.

DESCRIPTION:

Satellite water colour imagery will be analyzed for aerosol spatial distribution information and this will be correlated with existing airborne and ground based measurements.

DURATION OF PROJECT: 3 *YEARS* *PRESENT YEAR IS:* 2nd *YEAR* *REPORTING DATE:* Annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	27,640	13,349	2	1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-11

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1982

PROJECT TITLE: Sweet corn and green bean response to airpollution in Sourthern Ontario

KEY WORDS: Phytotoxicology, ozone

PRINCIPAL INVESTIGATOR AND AFFILIATION: Professor D. Ormrod, University of Guelph

LIAISON OFFICER OR SUPERVISOR: R. Pearson

RESEARCH CATEGORY:
INTERNAL —— *GRANT* —X
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To determine optimum protection strategy against ozone for sweet corn and green bean crops.

DESCRIPTION:

The effects of ozone, chemical protectants, location and cultivar type will be measured and correlated with yield and visible leaf injury for sweet corn and green bean crops.

DURATION OF PROJECT: 3 *YEARS*

PRESENT YEAR IS: 1st *YEAR*

REPORTING DATE: annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	51,590	15,500	3	1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-12

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* July,1982

PROJECT TITLE: Methods for the sampling and analysis of nitro-substituted polycyclic aromatic hydrocarbons.

KEY WORDS: Trace analysis, method development, nitro-PAH.

PRINCIPAL INVESTIGATOR AND AFFILIATION: Professors M.A. Quilliam and B.E. McCarry, McMaster University.

LIAISON OFFICER OR SUPERVISOR: O. Meresz, W.C. Tam

RESEARCH CATEGORY:
INTERNAL GRANT —X— *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:

to determine whether nitro-PAHs are a significantly hazardous constituent of auto exhaust and urban air.

DESCRIPTION:

Nitro-PAHs will be synthesized and used as standards to develop analytical methodology. This methodology will then be used to examine auto exhaust and urban air for the presence of these compounds.

DURATION OF PROJECT: 4 *YEARS* *PRESENT YEAR IS:* 4th *YEAR* *REPORTING DATE:* annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	73,033	26,000	4	1

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-13

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July,1982

PROJECT TITLE: Provision of PAHs and Aza-PAHs as environmental analytical standards.

KEY WORDS: PAH, synthesis

PRINCIPAL INVESTIGATOR AND AFFILIATION: Professor V. Snieckus, University of Waterloo

LIAISON OFFICER OR SUPERVISOR: O. Meresz, A. Szakolcai

RESEARCH CATEGORY: *INTERNAL* — *GRANT* X — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:

To provide PAHs and Aza PAHs as analytical standards.

DESCRIPTION:

Known carcinogenic PAHs and aza PAHs will be synthesized by short and efficient routes using previously worked out methods as well as alternates.

DURATION OF PROJECT: 2 *YEARS* — *PRESENT YEAR IS* 2nd *YEAR* — *REPORTING DATE:* annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	43,860	23,860	3	1

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-14

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1982

PROJECT TITLE: Acid Precipitation Estimation by Indicating Ion Exchange

KEY WORDS: Acid Precipitation

PRINCIPAL INVESTIGATOR AND AFFILIATION: Professor R.A. Stairs, Trent University

LIAISON OFFICER OR SUPERVISOR: M. Lusis

RESEARCH CATEGORY:
INTERNAL ___ *GRANT* X *UNSOLICITED CONTRACT* ___ *SOLICITED CONTRACT* ___ *MULTI-YEAR PROJECT* ___ *CONCURRENT PROJECT* ___

OBJECTIVE:

To develop and test a simple inexpensive method of estimating the integrated acid precipitation over a time interval.

DESCRIPTION:

A simplified rain guage will be used to feed precipitation to an ion-exchange resin stained with indicator.

DURATION OF PROJECT: 3 *YEARS* *PRESENT YEAR IS:* 2nd *YEAR* *REPORTING DATE:* annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	24,183	7,800	3	1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X *SPECIAL MINISTRY FUNDING* ___ *JOINTLY FUNDED PROJECT* ___ *OTHER* ___

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

DATE: July, 1982

BRANCH: Air Resources

PROJECT TITLE: Multielement Determination of Metals and Metal Compounds in Air and related Samples

KEY WORDS: Multielement analysis, Mercury, Arsenic, gas chromatography - atomic fluorescence spectrometry.

PRINCIPAL INVESTIGATOR AND AFFILIATION: Professor J.C. Van Loon, University of Toronto

LIAISON OFFICER OR SUPERVISOR: D. Boomer

RESEARCH CATEGORY: INTERNAL —— GRANT —X UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:

Development of sensitive analytical techniques for different chemical states of metals.

DESCRIPTION:

GC-AFS methods previously developed for lead and manganese compounds in air will be extended to mercury and arsenic compounds.

DURATION OF PROJECT: 4 YEARS

PRESENT YEAR IS: 4th YEAR

REPORTING DATE: annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	76,500	15,000	4	1

SOURCE OF FUNDS: REGULAR WORK PROGRAM X SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* July, 1982

PROJECT TITLE: Methods for sampling and analysis of asbestos air pollution in Ontario

KEY WORDS: Asbestos, Sampling, Analysis

PRINCIPAL INVESTIGATOR AND AFFILIATION: Professor D. Verma, McMaster University

LIAISON OFFICER OR SUPERVISOR: D. Corr, P. Roberts

RESEARCH CATEGORY:
INTERNAL —— *GRANT* —X
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To obtain by electron microscopy baseline data for asbestos levels in outdoor air and relate these exposure levels to those obtained by traditional optical microscopy.

DESCRIPTION:

Asbestos levels in various situations will be measured both by e.m. and optical microscopy.

DURATION OF PROJECT: 3 *YEARS* *PRESENT YEAR IS:* 2nd *YEAR* *REPORTING DATE:* annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	75,000	25,000	3	1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* July, 1982

PROJECT TITLE: Characterization of Airborne Particulate Matter

KEY WORDS: Particulate, Aerosol, Dichotomous Sampler

PRINCIPAL INVESTIGATOR AND AFFILIATION D. Corr, M.O.E.

LIAISON OFFICER OR SUPERVISOR

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To evaluate the performance of "inhalable particulate samplers" under Ontario conditions.

DESCRIPTION:

Several different models of dichotomous sampler a size selective inlet hivol and other particulate samplers are being operated in downtown Toronto. the collected samples are being analyzed for several parameters and the results from the different samples will be correlated.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	80,000	40,000	2	1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-18

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources *DATE:* July,1982

PROJECT TITLE: Organic Airborne Particulate Matter

KEY WORDS: Particulate, Aerosol, Organic, PAH

PRINCIPAL INVESTIGATOR AND AFFILIATION: Contractor not selected by August 1982

LIAISON OFFICER OR SUPERVISOR: W. C. Tam

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT X *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To develop a field sampling-laboratory analytical methodology for PAH and to establish ambient air objectives and guidlines.

DESCRIPTION:

Different sampling methodologies will be compared to combat the problem of PAH loss due to evaporation and oxidation.

DURATION OF PROJECT: 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	60,000	50,000	2	1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: Ministry of Labor

REMARKS:

Ministry of the Environment
Ontario

AR-19

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources

DATE: July, 1982

PROJECT TITLE: Organic Vapour Sampling

KEY WORDS: Organic Vapour, Sampling

PRINCIPAL INVESTIGATOR AND AFFILIATION: A. Szakolcai

LIAISON OFFICER OR SUPERVISOR:

RESEARCH CATEGORY:
INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE:

To develop a reliable method of sampling organic vapours in the field with subsequent analysis in the laboratory.

DESCRIPTION:

An organic vapour dynamic standards generator will be used to examine different adsorbent tube - pump combinations to determine breakthrough characteristics and proper sample handling procedures.

DURATION OF PROJECT: 2 YEARS

PRESENT YEAR IS: 2nd YEAR

REPORTING DATE: 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	75,000	30,000	2	1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: NO

REMARKS:

Ministry of the Environment
Ontario

AR-20

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Air Resources & Laboratory Services & Waste Management *DATE:* July, 1982

PROJECT TITLE: Trace Organic Contaminants

KEY WORDS: Waste, Incineration, Polychlorinated dibenzodioxins (PCDDs), Polychlorinated dibenzofurans (PCDFs), Chlorinated Aromatics, PCBs

PRINCIPAL INVESTIGATOR AND AFFILIATION: F. Hopton - ORF
H. Tosine - M.O.E. Laboratory

LIAISON OFFICER OR SUPERVISOR: V. Ozvacic, Project Co-ordinator

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* — — *SOLICITED CONTRACT* X — *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

Determine quantities of PCDDs, PCDFs and other related species in all discharge streams into the environment at selcted waste incinerator plants, identify likely precursors in the feedstock, develop measurement technology and monitor development of related health standards.

DESCRIPTION:

Sampling and preparation of uncleaned sample extracts was contracted to an outside consultant. Analyses and method development is performed in-house and development of health standards is the responsiblity of the Ministry of Labour.

Sampling was completed at three incinerators;

- Commissioners Street muncipal incinerator in Toronto
- Ashbridges Bay sewage sludge incinerator in Toronto
- SWARU in Hamilton

The last uncleaned set of sampling extracts from SWARU have been prepared. Chemical analysis is presently in progress. Sampling at the Dow Plant in Sarnia is scheduled for early 1983.

DURATION OF PROJECT: 2 *YEARS* — *PRESENT YEAR IS* 2nd *YEAR* — *REPORTING DATE* June 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	380,000	150,000	2	1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* X — *OTHER* ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES:
Ministry of Energy, Co-sponsors
Ministry of Labor, Health Effect Studies

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services And Applied Research Branch **DATE:** September 1, 1982

PROJECT TITLE: Nitrification-Denitrification For The Control Of Ammonia And Hydrogen Sulfide In Lagoon Effluents.

KEY WORDS: Extended aeration, no sludge wasting, nitrification, denitrification, lagoons.

INVESTIGATOR AND AFFILIATION: W. Lewandowski

LIAISON OFFICER OR SUPERVISOR: R. K. Khettry

RESEARCH CATEGORY: INTERNAL X GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:

1. To establish design and operating criteria for a simplified (no sludge wasting) nitrifying extended aeration system as a pre-treatment unit ahead of lagoons during winter operation.
2. To determine if the nitrate concentration produced are adequate and to prevent hydrogen sulfide accumulation in the lagoon contents.

DESCRIPTION:

A full scale nitrification study will be carried out at the Brampton, O.E.F. during the winter of 1981-1982 at varying aeration detention times and temperatures. No sludge wasting will be practiced. Main emphasis will be placed on ammonia conversion to nitrate. Monitored will be in and effluent BOD_5, SS, NH_3-N, TKN, NO_2, NO_3, pH, alkalinity, SO_4. In addition mixed liquor SS, VSS, DO, Temp. SVI, RR will be recorded. For denitrification, a clarifier will be used. Nitrified effluent will be fed continuously at a rate corresponding to six months detention. Clarifier effluent quality will be monitored as above. In addition, sulfide concentration will be monitored.

DURATION OF PROJECT: 2 YEARS **PRESENT YEAR IS:** 2nd - YEAR **REPORTING DATE:** Spring, 1983

BUDGET:	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$5,000	$2,000	0.2	0.1

SOURCE OF FUNDS: REGULAR WORK PROGRAM X —— SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services And Applied Research Branch DATE: September 1, 1982

PROJECT TITLE:
Phosphorus Removal From Secondary Effluents.

KEY WORDS:
Phosphorus, Secondary Effluent, Chemical Precipitation, Activated Sludge Plant.

INVESTIGATOR AND AFFILIATION: W. Lewandowski

LIAISON OFFICER OR SUPERVISOR: R. K. Khettry

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE:
To establish the most economical physical and chemical parameters, i.e. secondary clarifier sizing, chemical dosage, etc, for phosphorus removal to $\leq$ 0.5 mg/L T.P. by chemical precipitation with Iron or Aluminum salts in secondary activated sludge systems.

DESCRIPTION:
The study will be carried out a full-scale at the Brampton OEF. The removal efficiencies for BOD_5, S.S., T.P. and N. at varying F/M ratios and up to a maximum secondary clarifier upflow rate of 800 gpd/ft^2. The chemical (Fe, Al) requirements for total effluent Phosphorus concentration of $\leq$ 0.5 mg/L and for the varying upflow rates will be established. This will enable the corresponding molar ratios (Al:P, Fe:P) and the most economical combination of chemical dosage and clarifier size for $\leq$ 0.5 mg/L T.P. to be determined.

DURATION OF PROJECT: 3 YEARS — PRESENT YEAR IS: 3 rd YEAR — REPORTING DATE: December, 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$15,000.00	$1,000.00	0.5	0.02

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
No

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services And Applied Research Branch **DATE:** September 1, 1982

PROJECT TITLE:
To Determine The Average Unit Process Operating Costs In Several WPCP's.

KEY WORDS:
Operating costs for WPCP unit processes.

INVESTIGATOR AND AFFILIATION: Tom Brankovic

LIAISON OFFICER OR SUPERVISOR: R. K. Khettry

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE:
To determined the operation and maintenance time and costs associated with individual unit processes in a typical WPCP.

DESCRIPTION:
The operator's time and maintenance costs required to run the individual treatment processes in a typical WPCP were obtained from twenty-five southern Ontario WPCP's.

This information will assist the consultant and municipal engineers to optimize future WPCP design and operation.

DURATION OF PROJECT: 2 YEARS **PRESENT YEAR IS:** 2 YEAR **REPORTING DATE:** September, 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$5,000	$5,000	60 man days	60 man days

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
Participated by the Regions of Halton, York and Durham.

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services And Applied Research Branch *DATE:* September 1, 1982

PROJECT TITLE:
Conservation Of Nitrogen In Aerated Holding Tanks And Aerobic Digester Sludges.

KEY WORDS:
Aerobic Digestion, Sludge Disposal, Heavy Metals, Nitrogen.

PRINCIPAL INVESTIGATOR AND AFFILIATION J. Smart - MOE

LIAISON OFFICER OR SUPERVISOR R. K. Khettry

RESEARCH CATEGORY: *INTERNAL* X *GRANT* — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:
To assess the fate of nitrogen in aerobic digestion processes with a view to optimizing heavy metal to nitrogen (NH_3+NH_3) ratios for satisfactory land disposal of digested sludges.

DESCRIPTION:
Several aerobic digesters and aerated holding tanks have been monitored to show nitrogen conversion pathways. Particular emphasis has been placed on heavy metal to combined NH_3 and NO_3 ratios with respect to safe land disposal of sludges.
The relationship between solids content and nitrogen and metal levels during steady state digestion, settling and supernating operations has been investigated.

DURATION OF PROJECT 4 *YEARS* *PRESENT YEAR IS* 4 *YEAR* *REPORTING DATE* December 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$10,000.00	$2,000	0.5	0.05

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:
No

REMARKS:

Ministry of the Environment
Ontario

LS-5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services And Applied Research Branch *DATE:* September 1, 1982

PROJECT TITLE:
Full-Scale Anaerobic Digester Mixing Optimization And Loading Studies.

KEY WORDS:
Digester, Anaerobic, Mixing, Loading.

INVESTIGATOR AND AFFILIATION: I.E.C. Limited (Dr. Keith Murphy)

LIAISON OFFICER OR SUPERVISOR: R. K. Khettry

RESEARCH CATEGORY: *INTERNAL* — *GRANT* — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* X *MULTI-YEAR PROJECT* X *CONCURRENT PROJECT* —

OBJECTIVE:

1. To achieve optimization of mixing performance in a full-scale anaerobic digester at the Brantford WPCP, with minimization or elimination of dead space and substrate short circuit.

2. To establish upper organic and hydraulic loadings possible in the presence of optimum mixing.

DESCRIPTION:

A twenty-four month study to achieve digester mixing optimization and establish upper loading levels possible under this condition will be conducted at the Brantford WPCP. For the purpose, in addition to the three gas mixers installed in the test unit, five will be added as will additional gas blower capacity. To allow incremental energy applications to determine where satisfactory mixing is achieved. In the presence of good mixing as indicated by tracer washout studies, organic and hydraulic loadings to the test unit will be increased to levels hitherto unacceptable on full-scale in an attempt to illustrate the relationship between good mixing, loadings, and gas production associated with higher loadings.

DURATION OF PROJECT: 3 *YEARS* *PRESENT YEAR IS:* 2nd *YEAR* *REPORTING DATE:* 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$246,000	$40,000	0.5	0.1

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* X *OTHER* —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
Ministry of Energy/C.C.I.W.

REMARKS:

Ministry of the Environment
Ontario

LS-6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services And Applied Research Branch *DATE:* September 1, 1982

PROJECT TITLE:
To Investigate The Costs And Maintenance Required To Operate A Full-Scale Chlorination-Dechlorination System.

KEY WORDS:
Chlorination-Dechlorination.

INVESTIGATOR AND AFFILIATION: Tom Brankovic

LIAISON OFFICER OR SUPERVISOR: R. K. Khettry

RESEARCH CATEGORY: *INTERNAL* X *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
To Determine:
1. The capital and operating costs of a full-scale chlorination-dechlorination system;
2. The maintenance and reliability of such system;
3. Feasibility to further optimize the operation of a chlorination-dechlorination system in order to reduce its overall costs.

DESCRIPTION:

Many WPCP's will be required to dechlorinate their final effluents before discharge, in order to continually protect public health and water quality concurrently. Hence, a thorough understanding of the costs and operating experience associated with a full-scale chlorination-dechlorination system is important to future installations. The study is being carried out in Milton WPCP which is presently the only WPCP employs such system in Ontario. The operator's experience, maintenance records, the capital and operating costs of this system will be analysed and reported.

DURATION OF PROJECT: 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE:* March 31, 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$7,500	$5,000	60 man days	40 man days

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:
Participated by the Region of Halton.

REMARKS:

Ministry of the Environment
Ontario

LS-7

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services And Applied Research Branch *DATE:* September 1, 1982

PROJECT TITLE:
Nitrification-Denitrification For The Control of Ammonia And Hydrogen Sulfide In Lagoon Effluents.

KEY WORDS:
Extended aeration, no sludge wasting, nitrification, denitrification, lagoons.

INVESTIGATOR AND AFFILIATION: W. Lewandowski

LIAISON OFFICER OR SUPERVISOR: R. K. Khettry

RESEARCH CATEGORY:
INTERNAL X *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
1. To establish design and operating criteria for a simplified (no sludge wasting) nitrifying extended aeration system to be used as a pre-treatment unit ahead of lagoons during winter operation.
2. To determine if the nitrate concentrations produced are adequate to prevent hydrogen sulfide accumulation in the lagoon contents.

DESCRIPTION:

An existing extended aeration activated sludge plant followed by a polishing lagoon will be converted to a "no sludge wasting" system and monitored extensively till the fall of 1982.

DURATION OF PROJECT: 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE:* Spring, 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$10,000	$5,000	0.25	0.1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:
No

REMARKS:

Ministry of the Environment
Ontario

LS-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES *DATE:* July 8, 1982

PROJECT TITLE:
Magnetic Treatment in Water Purification

KEY WORDS: Drinking Water, Hardness, Magnetism

PRINCIPAL INVESTIGATOR AND AFFILIATION D.E. Wemyss, F.J. Dart; Water Technology Section

LIAISON OFFICER OR SUPERVISOR K. Roberts

RESEARCH CATEGORY:
INTERNAL X *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
To carry out a feasibility study which will define the magnetic water treatment process and its limitations

DESCRIPTION:
The investigation will involve specific control of the geometrical and mechanical aspects of the treatment process; equipment with the ability to vary process parameters will be used.

Accurate and consistent measurements will be made of the minutest changes in specifically chosen parameters. The determinations will be made before and after the magnetic treatment of high iron, variable hardness water

DURATION OF PROJECT 1 YEARS *PRESENT YEAR IS* 1 YEAR *REPORTING DATE* 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$20,000	$10,000	0.7	0.5

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-9

BRANCH: LABORATORY SERVICES

DATE: July 8, 1982

PROJECT TITLE:

Manganese Removal from Surface Water

KEY WORDS: Drinking water, manganese

PRINCIPAL INVESTIGATOR AND AFFILIATION: G. Martin

LIAISON OFFICER OR SUPERVISOR: A. Oda

RESEARCH CATEGORY:

INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To study various coagulation/filtration techniques for effectiveness in removing manganese from surface waters.

To study the use of ozone for colour removal in iron- and manganese-bearing waters.

DESCRIPTION:

Pilot plants including upflow clarifier and filters will be set up to investigate manganese removal by the high lime/ferric chloride process. Proprietary filters such as Durcon electromedia, manganese greensand will also be investigated.

Raw water conditions involving high colour and taste and odour are encountered also.

Ozone treatment will be evaluated for the effectiveness in reducing colour levels in manganese-laden waters.

DURATION OF PROJECT: 2 YEARS

PRESENT YEAR IS: final YEAR

REPORTING DATE: 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$11,500	$1,500	0.9	0.05

SOURCE OF FUNDS:

REGULAR WORK PROGRAM X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Interim report available

Ministry of the Environment
Ontario

LS-10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES *DATE:* July 8, 1982

PROJECT TITLE:
Asbestos in Potable Water Supplies

KEY WORDS: Asbestos, potable water

PRINCIPAL INVESTIGATOR AND AFFILIATION: R.B. Hunsinger - Water Technology Section

LIAISON OFFICER OR SUPERVISOR: K.J. Roberts

RESEARCH CATEGORY:
INTERNAL X *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
To survey asbestos levels in raw water and treated potable water throughout Ontario

DESCRIPTION:
Raw and potable water supplies throughout Ontario will be surveyed for asbestos levels. The data will be tabulated with raw water type, water treatment plant process and finished water quality. This is essentially an on-going project which monitors asbestos levels.

DURATION OF PROJECT —— *YEARS* *PRESENT YEAR IS* 8th *YEAR* *REPORTING DATE* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$118,000	$28,000	3.5	0.8

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED?
Yes, MOE Green Bound

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:
-Man years includes Regional MOE personnel
-Joint project with Laboratory Services Branch

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-11

BRANCH: LABORATORY SERVICES *DATE:* July 8, 1982

PROJECT TITLE:
Iron Sequestration

KEY WORDS: Iron, Potable Water

PRINCIPAL INVESTIGATOR AND AFFILIATION: F.J. Dart - Water Technology Section

LIAISON OFFICER OR SUPERVISOR: K. Roberts

RESEARCH CATEGORY: *INTERNAL* X — *GRANT* — — *UNSOLICITED CONTRACT* — — *SOLICITED CONTRACT* — — *MULTI-YEAR PROJECT* — — *CONCURRENT PROJECT* —

OBJECTIVE:
To improve control of iron in water supplies

DESCRIPTION:
Control of iron through addition of sodium silicate may be improved in water supplies in terms of extended stability, a broadened range of treatment effectiveness, and increased chemical efficiency. A newly developed procedure for preserving the unique chemical properties of fresh natural well waters for study back at the laboratory can now be utilized.

DURATION OF PROJECT continuing *YEARS* *PRESENT YEAR IS* ——— *YEAR* *REPORTING DATE* as each study completed

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	cont.	$6,500	Cont.	0.2

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* — — *SPECIAL MINISTRY FUNDING* — — *JOINTLY FUNDED PROJECT* — — *OTHER* —

IS A REPORT ANTICIPATED?

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:
This on-going study takes additional advantage of actual water supply difficulties as they arise for the unique insight they can help provide.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-12

BRANCH: LABORATORY SERVICES

DATE: July 8, 1982

PROJECT TITLE:

Manganese Sequestration

KEY WORDS: Manganese, Potable Water

PRINCIPAL INVESTIGATOR AND AFFILIATION: F.J. Dart - Water Technology Section

LIAISON OFFICER OR SUPERVISOR: K. Roberts

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To control manganese in water supplies

DESCRIPTION:

Control of manganese by sequestration techniques involving sodium silicate or hydrogen peroxide addition to the raw water will be studied and further optimized. The very effective sequestration of excess manganese by silicate is frequently frustrated by the usually slow and basically unpredictable rate of manganese oxidation for its capture by the silicate. The oxidizability of raw water manganese varies from "quickly oxidized by combined chlorine residuals" to "barely affected by generous free chlorine or chlorine dioxide additions".

Presently the peroxide procedure for manganese seems to be limited in practise to about 0.3 mg/L manganese. Strong rechlorination uses by customers in laundry and swimming pools can still create problems with higher manganese contents.

DURATION OF PROJECT: continuing ——— *YEARS* *PRESENT YEAR IS* ——— *YEAR* *REPORTING DATE:* as each study completed

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	Continuing	$16,000		0.35

SOURCE OF FUNDS:
REGULAR WORK PROGRAM —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes; in house documents re each investigation

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

This is an on-going study since each new manganese control situation could present a unique treatment requirement.

Ministry of the Environment
Ontario

LS-13

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES

DATE: July 8, 1982

PROJECT TITLE:

Trace Contaminants in Water Treatment Plant Chemicals

KEY WORDS: Trace contaminants, chemicals

PRINCIPAL INVESTIGATOR AND AFFILIATION: D.E. Wemyss - Water Technology Section

LIAISON OFFICER OR SUPERVISOR: K. Roberts

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To examine chemicals used in the potable water treatment process, by both physical and chemical analytical methods, for trace contaminants

DESCRIPTION:

Water treatment plant chemicals will be sampled and subjected to chemical and physical analyses for constituents with special emphasis being placed on trace contaminants.

In addition, raw chemicals and production processes at the manufacturing level will be checked for any variation in manufacturing techniques or precursor materials that might affect the quality of the products. The results will have probable significance in the water industry specifications for chemicals used in process or as additives.

DURATION OF PROJECT: 2.5 *YEARS* — *PRESENT YEAR IS* 2 *YEAR* — *REPORTING DATE* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$63,000	$33,000	2.5	0.9

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes - MOE Green Cover

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-14

BRANCH: LABORATORY SERVICES *DATE:* July 8, 1982

PROJECT TITLE:
Distribution System - Small Animal Survey

KEY WORDS: Protozoa, distribution system

PRINCIPAL INVESTIGATOR AND AFFILIATION: H.J. Graham - Water Technology Section

LIAISON OFFICER OR SUPERVISOR: K.J. Roberts

RESEARCH CATEGORY:
INTERNAL X *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To study the occurrence and magnitude and removal methods of small animals (e.g. snails, nematodes) in distribution systems.

DESCRIPTION:

Sample collection and survey (sometimes following foam-swab cleaning) of distribution mains; isolation; identification and enumeration of animal species.

DURATION OF PROJECT: on-going *YEARS* *PRESENT YEAR IS* 4th *YEAR* *REPORTING DATE* ——

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	continuing	$20,000	continuing	0.5

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Individual municipal reports

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-15

BRANCH: LABORATORY SERVICES *DATE:* July 8, 1982

PROJECT TITLE:
Trihalomethane Levels in Ontario Drinking Waters

KEY WORDS: Organics, potable water

PRINCIPAL INVESTIGATOR AND AFFILIATION: G. Martin and R.B. Hunsinger - Water Technology Section

LIAISON OFFICER OR SUPERVISOR: K. Roberts

RESEARCH CATEGORY:
INTERNAL X *GRANT* ——
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To survey and monitor trihalomethane compounds in raw and treated water supplies in Ontario.

DESCRIPTION:

Samples from water treatment plants throughout the province will be examined for trihalomethanes, particularly those chlorinated organics produced during treatment. The various treatments will be correlated with the occurrence of trace organic contaminants in the finished water.

DURATION OF PROJECT —— *YEARS* *PRESENT YEAR IS* 5 —— *YEAR* *REPORTING DATE* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$170,000	$30,000	6	1.0

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? Yes - MOE Green Cover

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

-essentially an on-going project which will be handled by MOE regions following report publication

-the report is a joint venture with Laboratory Services Branch

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-16

BRANCH: LABORATORY SERVICES

DATE: July 8, 1982

PROJECT TITLE:

Asbestos Cement (A/C) Pipe Corrosion

KEY WORDS:

Drinking Waters, asbestos, corrosion

PRINCIPAL INVESTIGATOR AND AFFILIATION: R. Hunsinger

LIAISON OFFICER OR SUPERVISOR: K. Roberts

RESEARCH CATEGORY: INTERNAL X — GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:

To investigate through surveys, the magnitude of asbestos concentrations in distribution systems utilizing A/C pipe in aggressive water situations.

DESCRIPTION:

Samples will be taken from municipalities identified as having A/C pipe and aggressive treated water. The A/C pipe manufacturers recommend a modified Langelier Index be the criteria to determine where A/C pipe be used/not used.

Where necessary treatment suggestions (soda ash addition, lime etc.) will be made to alleviate the aggressive condition and to avoid possible problems of asbestos pick-up in the distribution system.

DURATION OF PROJECT: 1 YEARS — PRESENT YEAR IS: final YEAR — REPORTING DATE: 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$25,000	$5,000	0.6	0.15

SOURCE OF FUNDS: REGULAR WORK PROGRAM —— SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-17

BRANCH: LABORATORY SERVICES

DATE: July 8, 1982

PROJECT TITLE:

The Occurrence of Yersinia enterocolitica in Selected Raw and Treated Drinking Waters in Ontario

KEY WORDS: Yersinia enterocolitica, Drinking Water

PRINCIPAL INVESTIGATOR AND AFFILIATION: Ann H. Vajdic

LIAISON OFFICER OR SUPERVISOR: Ann H. Vajdic

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To determine the frequency of occurrence of Yersinia enterocolitica in raw and treated municipal water supplies, using P-A and M-F cultures.

DESCRIPTION:

P-A and M-F cultures, after routine analysis for coliforms and other indicator bacteria has been completed, will be examined for the presence of Yersinia enterocolitica using established isolation techniques. All Gram negative isolates will be screened biochemically for characteristics typical of Yersinia species, and final identification will be completed on the API 20E system.

Isolates identified as Yersinia enterocolitica will be forwarded to the Ministry of Health, Environmental Bacteriology laboratory for final confirmation and virulence testing

DURATION OF PROJECT: 1 YEARS
PRESENT YEAR IS: 1st YEAR
REPORTING DATE: 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$36,000	$21,000	1.35	0.65

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? Yes - MOE Green Cover

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

LS-18

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES *DATE:* July 8, 1982

PROJECT TITLE:

A survey of water quality in distribution systems

KEY WORDS:

PRINCIPAL INVESTIGATOR AND AFFILIATION **H.J. Graham & R.B. Hunsinger - Water Technology Section**

LIAISON OFFICER OR SUPERVISOR **K.J. Roberts**

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To examine drinking water distribution systems for water quality changes in various health and asethetic related parameters.

DESCRIPTION:

To examine in detail the water quality in the treatment plant and the distribution system of selected municipalities. Parameters examined will include general chemistry, micro and macro-organisms, heavy metals and asbestos. About 25 locations will be examined in each year of the project.

DURATION OF PROJECT 2-3 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* Interim reports

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$44,000	$15,000	3.0	1.2

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X —— *SPECIAL MINISTRY FUNDING* X —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

1 Experience '82 student currently working on this project

MOE 1293 6/76

Ministry of the Environment
Ontario

LS-19

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES

DATE: July 8, 1982

PROJECT TITLE:

Organic removal at the Niagara Falls Water Treatment Plant

KEY WORDS: Water Treatment, Organics, Sampling, Jar Tests

PRINCIPAL INVESTIGATOR AND AFFILIATION: R. Hunsinger, G. Martin

LIAISON OFFICER OR SUPERVISOR: K. Roberts

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To optimize the Niagara Falls Water Treatment process for organic removal with minimum changes to the processes.

DESCRIPTION:

A sampling program will be set up to properly examine organics. This will involve calculation of plug flow, experimental determination of actual flow and sampling point location. Jar testing will be carried out to examine optimum dosages and chemical, examining both organics and inorganic parameters. Optimized condition of dosage and chemical will then be instituted on a plant scale.

DURATION OF PROJECT: 1 YEARS *PRESENT YEAR IS* 1 YEAR *REPORTING DATE* Sept. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$33,000	$33,000	0.9	0.9

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

No

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-20

BRANCH: LABORATORY SERVICES *DATE:* July 8, 1982

PROJECT TITLE:
Ozonation of Potable Water Supplies

KEY WORDS: Ozone, potable water

PRINCIPAL INVESTIGATOR AND AFFILIATION: A. Oda - Water Technology Section

LIAISON OFFICER OR SUPERVISOR: K.J. Roberts

RESEARCH CATEGORY:
INTERNAL X *GRANT* ——
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To investigate the use of ozone in potable water treatment

DESCRIPTION:

Laboratory bench scale and pilot plant studies of ozonation as applied to potable water treatment. Special attention will be paid to coloured waters with low turbidity with emphasis placed on the use of ozone as an alternate disinfectant to avoid chlorinated by-products.

DURATION OF PROJECT: Continuing *YEARS* *PRESENT YEAR IS* —— *YEAR* *REPORTING DATE* ——

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	Cont.	$8,000	Cont.	0.15

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? Yes; in-house documents available to municipalities as each investigation is completed

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

This is an on-going area of study.

MOE 1293 6/76

Ministry of the Environment
Ontario

LS-21

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES

DATE: July 8, 1982

PROJECT TITLE:

Ozone as an Alternative to Chlorination for Drinking Water Disinfection

KEY WORDS: Ozone, Disinfection, Drinking Water

PRINCIPAL INVESTIGATOR AND AFFILIATION: Dr. K.L. Murphy
IEC (International Engineering Consultants)

LIAISON OFFICER OR SUPERVISOR: A. Oda

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* X
MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To examine the use of ozone as an alternate disinfection for drinking water and to investigate possible by-products of ozone and/or chlorination and study their relative toxicity and potential health effects

DESCRIPTION:

Study will examine differing raw waters (turbidity, coloured, Great Lakes) and the by-products produced by the various processes of ozonation, ozonation/chlorination. By-products will be analyzed and evaluated for their health effects.

Study will attempt to establish design criteria for the use of ozone in water treatment in order to minimize formation of chlorinated organics in drinking water.

DURATION OF PROJECT: 3 *YEARS* *PRESENT YEAR IS:* 3rd *YEAR* *REPORTING DATE:* mid 1982

BUDGET:

TOTAL DOLLARS		*MAN YEARS*	
Total Project	Current Year	Total Project	Current Year
$214,680	$9,200	None from MOE	

SOURCE OF FUNDS:
REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING X
JOINTLY FUNDED PROJECT —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes, MOE Lottery report; interim quarterly reports will be available

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Provincial Lottery project 79-027-13
Man years are MOE Personnel
See Page PL-3.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-22

BRANCH: LABORATORY SERVICES

DATE: July 8, 1982

PROJECT TITLE: The Effect of Hydraulic Characteristics and Effluent Chlorination on the Incidence of Microorganisms of Public Health Significance in Receiving Waters.

KEY WORDS: Chlorination, pathogens, bacteria, effluent plume, sewage, receiving waters, hydraulic dispersion

PRINCIPAL INVESTIGATOR AND AFFILIATION: Beak Consultants Ltd.
Beak Division of Sandwell & Company

LIAISON OFFICER OR SUPERVISOR: Ann H. Vajdic

RESEARCH CATEGORY: INTERNAL GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT X — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE:

To determine if chlorinated sewage effluents result in significantly lower numbers of organisms of public health significance in receiving waters as compared to unchlorinated effluents.

DESCRIPTION:

Hydraulic, water quality and atmospheric conditions which contribute to the die-off of pathogenic bacteria in chlorinated and non-chlorinated sewage effluents and their receiving streams, will be investigated.

Four sewage treatment plants and their receiving waters (3 rivers and 1 Lake) will be investigated. All significant factors which influence bacterial growth and mortality in the receiving waters will be studied.

A sound basis for the development of guidelines and criteria for sewage effluent disinfection will be obtained.

DURATION OF PROJECT: 3 YEARS — PRESENT YEAR IS 3rd YEAR — REPORTING DATE 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$273,700	$4,300	None from MOE	

SOURCE OF FUNDS: REGULAR WORK PROGRAM — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER X

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Provincial Lottery Project 79-028-13
Man Years are MOE input

See Page PL-4.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-23

BRANCH: LABORATORY SERVICES *DATE:* July 8, 1982

PROJECT TITLE:
Organic Removal through Conventional Water Treatment Processes

KEY WORDS: Coagulant, Drinking Water, Jar Tests, PAC, PBAC, Alum, Ferric Chloride

PRINCIPAL INVESTIGATOR AND AFFILIATION: A. Benedek
Zenon Environmental Enterprises

LIAISON OFFICER OR SUPERVISOR: R.B. Hunsinger - K.J. Roberts

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT X *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT X *CONCURRENT PROJECT* ——

OBJECTIVE:

To examine the effects of conventional and exotic coagulants on the water treatment process with emphasis on organic removal

DESCRIPTION:

Jar tests simulating conventional treatment processes using 3 types of waters (Great Lakes, Natural Organic Content, Industrial Organic Content) and Alum, Alum + Activated Silica, Alum + Polyelectrolytes, Ferric chloride, PAC, and PBAC will be carried out to optimize for particulate and organic removal. The most promising will be examined as to removal mechanisms and prepared for pilot plant testing

DURATION OF PROJECT: 2 YEARS *PRESENT YEAR IS* 1 YEAR *REPORTING DATE* 1983

BUDGET:

	TOTAL DOLLARS TOTAL PROJECT	TOTAL DOLLARS CURRENT YEAR	MAN YEARS TOTAL PROJECTS	MAN YEARS CURRENT YEAR
Contract	$249,000	$100,000		
MOE share	30,000	10,000	None from MOE	

SOURCE OF FUNDS:
REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT X
OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No
Health & Welfare, Ottawa is a partner.

REMARKS: See Page PI-14 - Provincial Lottery Project No. 81-053-32.

Ministry of the Environment
Ontario

LS-24

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services And Applied Research Branch *DATE:* August 31, 1982

PROJECT TITLE:
Screening For Priority Organic Contaminants And Heavy Metals In Digested Municipal Sludges.

KEY WORDS:
Priority Organic Contaminants, Heavy Metals, Digested Sludges.

INVESTIGATOR AND AFFILIATION K. W. A. Ho, MOE.

LIAISON OFFICER OR SUPERVISOR G. Zukovs, MOE.

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To examine and compare the nature and quantity of volatile, and semi-volatile organic contaminants and heavy metals present in aerobically and anaerobically digested WPCP sludges.

DESCRIPTION:

Digested sludges were collected from five municipal WPCP's, each on three separate occassions. The samples will be analysed by GC/MS for organic contaminants, in addition to analyses for heavy metals and convention al quality parameters.

The results will be used to determine if the occurrance of organic contaminants can be related to sludge treatment process, and process conditions, and to the occurrence of heavy metals.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* March, 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$1K		0.4	

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:
Air Pollution Control Directorate, Environment Canada.

REMARKS:
GC/MS analyses were conducted by the Organic Method Development Section, Air Pollution Control Directorate, Environment Canada, In Ottawa.

Ministry of the Environment
Ontario

LS-25

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services And Applied Research Branch *DATE:* August 31, 1982

PROJECT TITLE:
UV Disinfection Of Secondary Effluent

KEY WORDS:
UV, Disinfection, Secondary Effluent

INVESTIGATOR AND AFFILIATION Peter Bohm, MOE.

LIAISON OFFICER OR SUPERVISOR K. W. A. Ho, MOE.

RESEARCH CATEGORY: *INTERNAL* — *GRANT* X — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:
To investigate the effectiveness of UV Irradiation for the disinfection of a typical secondary effluent in an Ontario WPCP.

DESCRIPTION:
The study evaluated the performance of a pilot scale, proprietary UV disinfection unit in a typical Southern Ontario WPCP (Richmond Hill). The relationship between UV intensity, exposure time, effluent physical chemical quality and disinfection efficiency were investigated and reported.

DURATION OF PROJECT 2.5 *YEARS* *PRESENT YEAR IS* 2.5 *YEAR* *REPORTING DATE* December, 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$2K			

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:
The study was supported by the Region of York in supplying the WPCP facilities and by the Water Refining Inc., in loaning the UV disinfection unit.

Ministry of the Environment
Ontario

LS-26

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services And Applied Research Branch *DATE:* August 31, 1982

PROJECT TITLE:
The Applicability Of UV Disinfection Technology In Ontario Wastewater Treatment Plants.

KEY WORDS:
UV Disinfection, Municipal Wastewater Treatment Plants.

INVESTIGATOR AND AFFILIATION Dr. L. W. MacPherson, Standard Biological Laboratories.

LIAISON OFFICER OR SUPERVISOR K. W. A. Ho, MOE.

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* —— *UNSOLICITED CONTRACT* X *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
- To determine the applicability and design requirements for UV disinfection technology in Ontario, tertiary and secondary WPCP's;
- To investigate the significance of photo-reactivation of bacterial organisms in UV disinfected effluents.

DESCRIPTION:
- The study will be carried out in eight different tertiary and secondary municipal WPCP's. To assist design requirements for UV disinfection technology, UV dosages required to achieve target levels of coliform indicators and two selected pathogenic bacteria will be determined in relationship to effluent quality. The significance of photo-reactivation of coliforms indicators will be assessed against the photo-reactivation of pathogenic bacteria and disinfection condition provided initially.

DURATION OF PROJECT – 2 —— *YEARS* *PRESENT YEAR IS* 2nd — *YEAR* *REPORTING DATE* December, 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$40,750	$17,800	None from MOE	

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* X Prov. Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:
The funding for this study is provided by the Provincial Lottery Fund Project No. 81-054-32.

See Page PL-15.

Ministry of the Environment
Ontario

LS-27

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services And Applied Research Branch *DATE:* August 31, 1982

PROJECT TITLE:
Formation Of Chlorinated Organics During Disinfection Of Secondary Effluent.

KEY WORDS:
Chlorinated Organics, Chlorine Disinfection, Wastewater Effluent.

INVESTIGATOR AND AFFILIATION H. Kronis, MOE.

LIAISON OFFICER OR SUPERVISOR K. W. A. Ho, MOE.

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
To examine the factors that influence the formation of chlorinated organics during the disinfection of secondary effluent, and hence, develop effective means to reduce their formation.

DESCRIPTION:
The study is being carried out in a full scale WPCP in Southern Ontario to closely examine the effect of varying three key parameters on the nature and quantity of chlorinated organics formation. The three parameters are:

(1) Chlorine concentration in the concentrate stream (500 mg/L and 1,700 mg/L as Cl_2).
(2) Chlorine concentrate contact time (2 and 5 minutes).
(3) Undisinfected effluent quality.

Feasibility to reduce chlorinated organics formation by direct gaseous chlorination will also be evaluated. All chlorinated effluent samples will be disinfected with either the concentrate or gaseous chlorine to a constant dosage of 10 mg/L and 30 minutes contact time. Formation of chlorinated organics in the concentrate stream and in the chlorinated samples will be monitored by GC and total organic halogen "tox" analyses.

DURATION OF PROJECT 2.5 *YEARS* *PRESENT YEAR IS* 2.5 *YEAR* *REPORTING DATE* April, 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$15K		1.5	

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:
The study was supported by the MOE, Organics Trace Contaminants Section for initial GC/MS identification analysis.

Ministry of the Environment
Ontario

LS-28

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services And Applied Research Branch *DATE:* August 31, 1982

PROJECT TITLE:
Evaluation Of Field Test Kits.

KEY WORDS:
Field Test Kits.

INVESTIGATOR AND AFFILIATION D. Woodside, MOE.

LIAISON OFFICER OR SUPERVISOR K. W. A. No, MOE.

RESEARCH CATEGORY:
INTERNAL —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
To determine the accuracy and applicability of several field test kits designed for measuring total phosphorus, ammonia and nitrate concentrations in sewage effluents.

DESCRIPTION:
The accuracy and applicability of several field test kits will be tested against final effluents collected in eight municipal WPCP's and against user's laboratory experience.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* December, 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$0.5 K		0.3	

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

LS-29

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services And Applied Research Branch *DATE:* August 31, 1982

PROJECT TITLE:
Kennedy-Burnett Urban Stormwater Runoff Treatment Study.
(Part of the Rideau River Study).

KEY WORDS: Urban Drainage, Stormwater Runoff, Kennedy-Burnett Pond, Rideau River Study, Flooding, Impoundment.

INVESTIGATOR AND AFFILIATION Regional Municipality of Ottawa, Carleton.

LIAISON OFFICER OR SUPERVISOR G. Zukovs and D. G. Weatherbe

RESEARCH CATEGORY:					
	INTERNAL ——	*UNSOLICITED CONTRACT* X	*MULTI-YEAR PROJECT* ——
	GRANT ——	*SOLICITED CONTRACT* ——	*CONCURRENT PROJECT* ——

OBJECTIVE:

To determine the efficiency and effectiveness of short-term impoundment as a means of treatment for stormwater runoff from an urban catchment. To characterize runoff quantity and quality from the urban catchment in relation to precipitation, antecedent dry periods and changes in land use activities.

DESCRIPTION:

A full-scale field study over a three year period, at an impoundment already constructed will permit preparation of a comprehensive report relating to project objectives. RMOC has prepared a detailed proposal on the basis of Project Steering Committee discussions.

The first year of work will result in a functioning Treatment Monitoring system. Data collection will be carried out in May - October of the second and the year. An interim report will be prepared during the second year and a final report at the end of the third year. The Regional Municipality of Ottawa-Carleton is the operator of recently completed and proposed impoundments in lower-tier municipalities within the region. It's operating staff will benefit from experience gained in a well controlled field study.

A parallel computer modelling study will extend observed data and assist in generalizing the results.

DURATION OF PROJECT		*PRESENT YEAR IS*		*REPORTING DATE*
3	*YEARS*	3	*YEAR*	1983

BUDGET:	*TOTAL DOLLARS*		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$380,000	$70,000	None from MOE	

SOURCE OF FUNDS:						
REGULAR WORK PROGRAM	——	*SPECIAL MINISTRY FUNDING*	——	*JOINTLY FUNDED PROJECT*	——	*OTHER* X Provincial Lottery

IS A REPORT ANTICIPATED? Yes. MOE paid a total of $100,000 to the Project in only the first year as Lottery Project 79-030-33.

PARTICIPATION BY OTHER MINISTRIES: No

No. Partners are Ottawa-Carleton, Environment Canada, etc.

REMARKS:

Impoundment has been widely proposed as a method of stormwater treatment but reliable data relating to efficiency and effectiveness is not available. Such data is required as input to the Rideau River Study and is desirable before the MOE advocates impoundment treatment for wide scale use.

MOE 1293 6/76 Provincial Lottery Project 79-030-33 was the start of this investigation.
See Page PL-7.

Ministry of the Environment
Ontario

LS-30

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services And Applied Research Branch DATE: August 27, 1982

PROJECT TITLE:
Assessment and Modelling of I/I Flows In Stratford.

KEY WORDS:
Inflow/Infiltration, Simulation Modelling, Sanitary Sewerage.

INVESTIGATOR AND AFFILIATION: W. M. Wong, MOE

LIAISON OFFICER OR SUPERVISOR: G. Zukovs, MOE

RESEARCH CATEGORY: INTERNAL —— GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT X CONCURRENT PROJECT ——

OBJECTIVE:

To develop methodology for the assessment and prediction of wet weather flows in sanitary sewer systems.

DESCRIPTION:

Three phase study:

1. Field measurements and analysis to establish behaviour of dry and wet weather flows in Stratford sanitary sewerage including relationship of flow to population, water consumption and precipitation.

2. Development of assimilation model to predict the behaviour of wet weather flows including i) the quantities of sewage bypass and ii) the projected effectiveness of corrective measures (storage and source control). iii) verification of effectiveness of corrective measures through pilot sewer rehabilitation program supported by additional monitoring and simulation.

DURATION OF PROJECT: 3 YEARS PRESENT YEAR IS 2 YEAR REPORTING DATE June 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	122K	57K		

SOURCE OF FUNDS: REGULAR WORK PROGRAM —— SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED X PROJECT OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Program jointly sponsored by Stratford-Avon River Environmental Management Project and the City of Stratford.

MAR 1983 6/76

Ministry of the Environment
Ontario

LS-31

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services And Applied Research

DATE: August 27, 1982

PROJECT TITLE:
Characterization of Runoff Quantity/Quality Relationships - Taylor Creek

KEY WORDS:
Stormwater runoff, pollutant sources and loadings.

INVESTIGATOR AND AFFILIATION: M. Chow, University of Toronto

LIAISON OFFICER OR SUPERVISOR: G. Zukovs, MOE

RESEARCH CATEGORY: INTERNAL —— GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:
To determine the nature and source of pollutants in runoff from a residential catchment.

DESCRIPTION:
Field measurements will include runoff quantity and quality at the outlet of a residential catchment, quality of runoff flows originating from roofs, pervious areas, gutters, etc, and loading of pollutants in street dust and dirt. Analysis will develop pollutant budgets for residential land use.

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS 1 YEAR — REPORTING DATE: December, 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	4K			

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:
Joint program with the University of Toronto and MOE, Central Region.

Ministry of the Environment
Ontario

LS-32

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services And Applied Research Branch *DATE:* August 27, 1982

PROJECT TITLE:

Assessment of Stormwater Detention Ponds.

KEY WORDS: Stormwater, detention ponds.

INVESTIGATOR AND AFFILIATION: Mary Asselstine, York University

LIAISON OFFICER OR SUPERVISOR: G. Zukovs, MOE

RESEARCH CATEGORY: *INTERNAL* — *GRANT* X *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:

To determine the effectiveness of various stormwater detention facilities for removal of pollutants in runoff.

DESCRIPTION:

The quality and quantity of inflow and outflow will be monitored at four stormwater detention ponds. The ponds have been selected to reflect different land-use in the tributary catchments and different pond operating policies.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE* June, 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	8.5K			

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* — *SPECIAL MINISTRY FUNDING* X Experience '82 *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Joint program, York University and MOE, Central Region.

Ministry of the Environment
Ontario

LS-33

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services And Applied Research Branch

DATE: August 27, 1982

PROJECT TITLE:
Analysis And Control of Large Combined Sewer Systems

KEY WORDS:
Combined sewer, simulation, control.

INVESTIGATOR AND AFFILIATION: W. M. Wong, MOE

LIAISON OFFICER OR SUPERVISOR: G. Zukovs

RESEARCH CATEGORY: INTERNAL —— GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT X —— CONCURRENT PROJECT ——

OBJECTIVE:

1. To assess frequency, volume and pollutant loading from the Metro Toronto combined sewer system under present and future land-use conditions.

2. To assess the effectiveness of various strategies for the control of combined sewer overflow in the Metro area.

DESCRIPTION:

A component of the Toronto Area Watershed Management Study with the following activities:

1) Field measurements to determine frequency, quantity and quality of combined sewer overflows discharged to drainage basins of interest.

2) Calibration and verification of SWMM model for simulation of combined sewer system behaviour under present and future land-use.

3) Analysis of the effectiveness of various measures for overflow control.

4) Development of an optimal strategy for the control of combined sewerage in Metro Toronto.

DURATION OF PROJECT: 3 YEARS — PRESENT YEAR IS 1 YEAR — REPORTING DATE: March, 1985

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	200K	35K		

SOURCE OF FUNDS: REGULAR WORK PROGRAM —— SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED X PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Joint program with Metro Toronto, Cities and Boroughs and MOE, Central Region.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-34

BRANCH: Laboratory Services And Applied Research Branch

DATE: August 27, 1982

PROJECT TITLE:

Design Procedures For Stormwater Ponds Used For Control of Runoff Quality

KEY WORDS:
Stormwater, pond, design

INVESTIGATOR AND AFFILIATION: G. Zukovs, MOE

LIAISON OFFICER OR SUPERVISOR: G. Zukovs, MOE

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE:

To develop procedures and criteria for the design of stormwater detention/retention facilities used for the improvement of runoff quality.

DESCRIPTION:

Various design procedures, (both simulation modelling and probabilistic) will be evaluated. Based upon this assessment, procedures suitable for use in Ontario will be recommended.

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS 1 YEAR — REPORTING DATE: January, 1984

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	15K			

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

LS-35

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services And Applied Research Branch

DATE: August 27, 1982

PROJECT TITLE:
Investigations of Persistent Toxic Substances In Urban Runoff Draining Into The Niagara River.

KEY WORDS:
Hazardous Contaminants, Urban Runoff, Niagara River

INVESTIGATOR AND AFFILIATION: J. Marsalek, Environmental Hydraulics Division, Environment Canada.

LIAISON OFFICER OR SUPERVISOR: K. W. A. Ho

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE:
To estimate annual loadings of hazardous contaminants in the urban runoffs draining into the Niagara River.

DESCRIPTION:
Composite samples will be taken during storm events in nine sites selected in three urban areas, Fort Erie, Welland and Niagara Falls. The samples will be analysed by GC/MS for priority pollutants, as well as pesticides and heavy metals. Data from these cities will be used in conjunction with other information, to estimate the frequency of persistent toxic contaminants occurrences in urban runoff and to estimate annual loadings to the Lower Great Lakes.

DURATION OF PROJECT: 1.5 YEARS — PRESENT YEAR IS — 1 — YEAR — REPORTING DATE: September, 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR

SOURCE OF FUNDS: REGULAR WORK PROGRAM — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER X

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
Environment Canada

REMARKS:
Part of the analytical requirement is supported by MOE.

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY LS-36

BRANCH: Laboratory Services And Applied Research Branch DATE: August 27, 1982

PROJECT TITLE:

Hazardous Contaminants In Hamilton WPCP

KEY WORDS:

Hazardous Contaminants, Conventional Activated Sludge Treatment Plant.

INVESTIGATOR AND AFFILIATION: Canviro Consultants Limited

LIAISON OFFICER OR SUPERVISOR: K. W. A. Ho

RESEARCH CATEGORY: INTERNAL — GRANT — UNSOLICITED CONTRACT X SOLICITED CONTRACT — MULTI-YEAR PROJECT X CONCURRENT PROJECT —

OBJECTIVE:

1. To estimate annual loadings of hazardous contaminants including metals, pesticides and selected trace organic contaminants discharged into the Hamilton Harbour.

2. To assess removal efficiency and operational factors affecting the removal of hazardous contaminants.

DESCRIPTION:

Raw sewage, final effluent and combined inplant wastes return will be sampled (24 hour composite) seven times per period for three periods (summer, winter and spring). Samples will be first separated into solids and liquid fractions. Each fraction will then be "quantitatively" analysed for hazardous contaminants.

The WPCP operating conditions will not be altered but closely monitored.

DURATION OF PROJECT: 1.5 YEARS PRESENT YEAR IS 1 YEAR REPORTING DATE: August, 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$60,000	$45,000		

SOURCE OF FUNDS: REGULAR WORK PROGRAM — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT X OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

Environment Canada

REMARKS:

This is one of a four parts study in the Hamilton WPCP. Studies to evaluate (1) water quality in Hamilton Harbour (Water Resources Branch), (2) fate of hazardous contaminants during sludge incineration and (3) effectiveness of three selected sludge treatment processes for the removal/fixation of hazardous contaminants (Environment Canada) are being conducted concurrently.

MOE 1293 6/76

Ministry of the Environment
Ontario

LS-37

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services

DATE: July 1/82

PROJECT TITLE:
Evaluation of the virucidal efficiency of an Ultra-violet disinfection process at the Tillsonburg STP

KEY WORDS: virus, sewage effluent, disinfection, ultra-violet, chlorination

INVESTIGATOR AND AFFILIATION: G. Jenkins GDJ 8202

LIAISON OFFICER OR SUPERVISOR: A. Burger

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT X — CONCURRENT PROJECT —

OBJECTIVE:
To evaluate an experimental ultraviolet disinfection process currently installed in the Tillsonburg STP.

DESCRIPTION:
Sample will be collected from the influent to, and the efffluent from, a U.V. disinfection unit installed in the effluent from the Tillsonburg STP. Samples will also be collected from effluent before and after chlorination. Quantitative methods will be used to evaluate the virucidal efficiency of each disinfection process.

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS 1st YEAR — REPORTING DATE: March '84

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	24,000	6,000	1.0	0.25

SOURCE OF FUNDS: REGULAR WORK PROGRAM x — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT X — OTHER X

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1294 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-38

BRANCH: Laboratory Services

DATE: July 1/82

PROJECT TITLE:
Development of Quantitative Assay for the Recovery of Enteric Viruses

KEY WORDS: enteric, virus, method, quantitative, MPN, plaque assay

INVESTIGATOR AND AFFILIATION: G. Jenkins GDJ 8203

LIAISON OFFICER OR SUPERVISOR:

RESEARCH CATEGORY: INTERNAL X GRANT ___ UNSOLICITED CONTRACT ___ SOLICITED CONTRACT ___ MULTI-YEAR PROJECT ___ CONCURRENT PROJECT ___

OBJECTIVE:
To develop method allowing the enumeration of viruses isolated from environmental samples.

DESCRIPTION:

Develop and evaluate MPN (tissue culture) and plaque assay techniques for the quantitative assessment of enteric viruses.

DURATION OF PROJECT: 2 YEARS PRESENT YEAR IS 1st YEAR REPORTING DATE: Dec. '83

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	18,000	6,000	0.75	0.25

SOURCE OF FUNDS: REGULAR WORK PROGRAM X SPECIAL MINISTRY FUNDING ___ JOINTLY FUNDED PROJECT ___ OTHER ___

IS A REPORT ANTICIPATED? Yes - Methods Manual

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1234 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-39

BRANCH: Laboratory Services

DATE: July 1/82

PROJECT TITLE:
Evaluation of Secondary Concentration Methods for the Recovery of Enteric Viruses from environmental samples.

KEY WORDS: virus, method, organic floculation, hydroextraction, ultrafiltration Secondary Concentration

INVESTIGATOR AND AFFILIATION: G. Jenkins GDJ 8204

LIAISON OFFICER OR SUPERVISOR: A. Burger

RESEARCH CATEGORY: INTERNAL X GRANT ___ UNSOLICITED CONTRACT ___ SOLICITED CONTRACT ___ MULTI-YEAR PROJECT ___ CONCURRENT PROJECT ___

OBJECTIVE:
To evaluate methods for the secondary concentration of viruses.

DESCRIPTION:
Four methods for the secondary concentration of enteric viruses will be evaluated, namely:

1. PEG Hydroextraction
2. Organic Flocculation
3. Ultrafiltration
4. Filtration with $AlCl_3$ and Celite

DURATION OF PROJECT: 3 YEARS PRESENT YEAR IS 1st YEAR REPORTING DATE Dec. '85

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	24,000	6,000	1.0	0.25

SOURCE OF FUNDS: REGULAR WORK PROGRAM X SPECIAL MINISTRY FUNDING ___ JOINTLY FUNDED PROJECT ___ OTHER ___

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

LS-40

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES *DATE:* July 6, 1982

PROJECT TITLE:

One-Step Fecal Coliform Isolation and Enumeration

KEY WORDS: Fecal coliform, enumeration, methodology

INVESTIGATOR AND AFFILIATION: J.E. Pagel JEP 8102

LIAISON OFFICER OR SUPERVISOR: L.T. Vlassoff

RESEARCH CATEGORY: *INTERNAL* x *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To develop and evaluate a single-step membrane filter procedure for the enumeration of fecal coliforms on mTEC agar

DESCRIPTION:

Fecal coliforms are used in water quality examination and assessment as indicators of fecal contamination. Since a variety of problems are associated with the methods presently available, this study is designed to develop a single-step method that can be used as standard MOE procedure for the enumeration of fecal coliforms on mTEC medium.

Studies were conducted under different incubation conditions (temperature-time relationships vs. recoveries) to develop a single-step mTEC procedure which best simulates the two-step mTEC method for fecal coliform enumeration.

DURATION OF PROJECT: 2.5 YEARS *PRESENT YEAR IS* 3rd YEAR *REPORTING DATE* December 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
		2,000	0.4	0.1

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* x *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes (Internal MOE report, possible publication)

COORDINATION BY OTHER MINISTRIES: No

REMARKS: Experimental work completed. Paper published: "Comparison of Four Membrane Filter Methods for Fecal Coliform Enumeration: (J.E. Pagel, P.L. Seyfried, and A.E. Pickergill) Appl. Environ. Microbiol. 43:787 (April, 1982).

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services and Pollution Control *DATE:* July 6, 1982

PROJECT TITLE:
U.V. Disinfection Study - Microbiological Aspects

KEY WORDS: Ultraviolet, disinfection, sewage, microbiology

INVESTIGATOR(S) AND AFFILIATION: J.E. Pagel JEP 8101

LIAISON OFFICER OR SUPERVISOR: L.T. Vlassoff

RESEARCH CATEGORY: *INTERNAL* X — *GRANT* — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:

Selected microbial indicators and pathogenic bacteria are enumerated to evaluate the applicability of U.V. disinfection for sewage effluents.

DESCRIPTION:

Phase 1:

Eight water pollution control plants (WPCP's) were monitored. Densities of indicator bacteria and pathogens in effluents were determined before and after U.V. disinfection at three dosages. The magnitude of any photo-reactivation effect was also measured.

Phase 2:

An in-depth study was carried out at four WPCP's using the optimal conditions and parameters determined in Phase 1. Long-term performance of U.V. disinfection technology was evaluated in the second phase.

DURATION OF PROJECT 1 YEARS *PRESENT YEAR IS* 1st YEAR *REPORTING DATE* August 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	16,000	16,000	1.2	1.2

SOURCE OF FUNDS: REGULAR WORK PROGRAM — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED?
Yes - internal report and possible publication

PARTICIPATION BY OTHER MINISTRIES:
No

COMMENTS: This study will provide supportive microbiology data for Standard Biological Laboratories' project (Title: Application of U.V. Disinfection Technology

Ministry of the Environment
Ontario

LS-42

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services DATE: June 21, 1982

PROJECT TITLE:
Evaluation of microdiffusion technique for the extraction of fluoride from vegetation and soil.

KEY WORDS: Fluoride, microdiffusion, extraction, vegetation, soil ion selective electrode.

INVESTIGATOR AND AFFILIATION: Dr. J. C. Hipfner Project # JCH-8101

LIAISON OFFICER OR SUPERVISOR: J. N. Bishop

RESEARCH CATEGORY: INTERNAL X GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE:
To develop an improved, simple and safe procedure for the determination of fluoride in vegetation and soil samples which will be comparable to the ignition/fusion technique but without its inherent hazards.

DESCRIPTION:
The current procedure for fluoride involves an ignition/fusion step followed by an automated distillation and colourimetric analysis. The procedure is hazardous in so far as it involves high temperatures and alkali fusion. A simple procedure requiring extractions by dilute acids, aqueous or buffer solutions at low temperatures 150°C will eliminate most hazards and allow an automated I.S.E. measurement. Samples will be placed in a 47 mm petri-dish wetted with 30% $HClO_4$ and heated over-night in an oven at 50°C. A filter paper impregnated with NaOH will be positioned in the petri-dish cover. Fluoride released from the sample as HF will be trapped on the filter paper and subsequently extracted with either a buffer solution or water for analysis by fluoride ion selective electrode.

DURATION OF PROJECT: ½ YEARS PRESENT YEAR IS 1982 YEAR REPORTING DATE: September 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	6,000	6,000	1/4	1/4

SOURCE OF FUNDS: REGULAR WORK PROGRAM X SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:
None

REMARKS:
Some preliminary work has been done and the results are encouraging.

Ministry of the Environment
Ontario

LS-43

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services

DATE: July 8, 1982

PROJECT TITLE:
Determination of cyanide species by Ion Chromatography and Electrochemical and conductometric detection.

KEY WORDS:
Cyanides, Complex cyanides, Thiocyanate, Ion Chromatography

INVESTIGATOR AND AFFILIATION: Dr. J.C. Hipfner JC 8201

LIAISON OFFICER OR SUPERVISOR: J.N. Bishop

RESEARCH CATEGORY: INTERNAL X GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE:

a) To determine free cyanide in presence of complexed cyanide and thiocyanate by ion chromatography.

b) To determine total cyanide in presence of thiocyanate following automated distillation by ion chromatography.

DESCRIPTION:

The currently used pyridine-barbituric acid method of determining cyanides does not differentiate between free and complexed cyanides. Besides, it suffers from interference by thiocyanate ions.

Ion Chromatograph equipped with electrochemical and conductometric detectors can differentiate between cyanide species. Additionally, this technique provides a safe and an interference free alternative to a potentially hazardous method presently in use. The proposed method may be applicable to environmental samples with or without a prior automated distillation step.

DURATION OF PROJECT: 1 YEARS — PRESENT YEAR IS: 1st YEAR — REPORTING DATE: December, 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	7350	7350	0.33	0.33

SOURCE OF FUNDS: REGULAR WORK PROGRAM — SPECIAL MINISTRY FUNDING X — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1714 6/76

Ministry of the Environment
Ontario

LS-44

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services DATE: June 14, 1982

PROJECT TITLE: Determination of thallium in environmental samples by differential pulse anodic stripping voltammetry (DPASV)

KEY WORDS: Thallium, DPASV, environmental samples.

INVESTIGATOR AND AFFILIATION: R.S. Sadana RS 80-1

LIAISON OFFICER OR SUPERVISOR: J.N. Bishop

RESEARCH CATEGORY: INTERNAL x — GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:

To develop a sensitive method for total thallium, Tl+ and Tl 3+ in a variety of environmental matrices. To investigate and eliminate possible interferences by the use of complexing and reducing agents.

DESCRIPTION:

Thallium is a highly toxic metal. Currently, the I.T.C. section does not have an acceptable method for determination of thallium at parts per billion concentrations. Measurable amounts of thallium have been detected in emissions from cement plants, some effluents and mine tailings as well as suspended air particulate matter.

A DPASV analytical method has been developed. The method also allows thallium speciation. Accuracy of the measurement step will be further checked using SRM materials. The method will be applied to the determination of thallium in the above mentioned matrices.

DURATION OF PROJECT: 1/2 YEARS — PRESENT YEAR IS 1982 YEAR — REPORTING DATE: June 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	10,200	6,200	1/2	1/4

SOURCE OF FUNDS: REGULAR WORK PROGRAM x — SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-45

BRANCH: Laboratory Services DATE: June 14, 1982

PROJECT TITLE:

Characterization of urban air particulate matter in Hamilton.

KEY WORDS:

air particulate matter, steel mill emissions, dichotomous sampler

INVESTIGATOR AND AFFILIATION: J. A. Pimenta, P.V. Vijan J.P. 8201

LIAISON OFFICER OR SUPERVISOR: J. N. Bishop

RESEARCH CATEGORY: INTERNAL -X- UNSOLICITED CONTRACT — MULTI-YEAR PROJECT —
GRANT — SOLICITED CONTRACT — CONCURRENT PROJECT —

OBJECTIVE:

To determine the nature of suspended air particulate matter in the vicinity of the steel manufacturing complex in Hamilton, using the dichotomous sampler.

DESCRIPTION:

A size fractionating air particulate sampler was operated in Hamilton during the long strike at Stelco and for a period of time after it. The sampler collects the air borne dust in two size range <2.5 μm in diameter and 2.5 to 15 μm in diameter, on chemically pure quartz fibre filters. Samples will be analysed for various chemical elements using graphite tube, atomic absorption and inductively coupled argon plasma spectrometry. Selected samples will be examined for discrete particles using an electron microprobe.

DURATION OF PROJECT: 1/2 YEARS PRESENT YEAR IS 1982 YEAR REPORTING DATE June 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	11,000	5,500	1/2	1/4

SOURCE OF FUNDS: REGULAR WORK PROGRAM x SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

MOE 1241 6/75

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY LS-46

BRANCH: Laboratory Services Branch DATE: June 1, 1982

PROJECT TITLE: Determination of Nickel and Cobalt by differential pulse polarography in atmospheric precipitation.

KEY WORDS: Nickel, Cobalt, Differential Pulse Polarography (DPP), Atmospheric precipitation.

INVESTIGATOR AND AFFILIATION: R.S. Sadana, I.T.C. Section RS-8201

LIAISON OFFICER OR SUPERVISOR: J. N. Bishop

PROJECT CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE: To determine nickel and cobalt at ppb levels in precipitation samples.

DESCRIPTION: Because of the emission of Nickel and Cobalt in Sudbury area these elements are invariably present in precipitation samples collected in Northern Ontario. These metals could serve as tracers for the source identification of air pollution. A senstitive DPP method will be developed to determine nickel and cobalt and applied to precipitation samples. Instrumental parameters and solution chemistry will be optimized. The method will be compared with ICP (inductively coupled plasma) technique. The accuracy, precision and interference study will be carried out.

DURATION OF PROJECT: 1/2 YEARS PRESENT YEAR IS ——— YEAR REPORTING DATE January 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	11,000	5,500	1/2	1/4

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

None

REMARKS:

Ministry of the Environment
Ontario

LS-47

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services Branch

DATE: June 1, 1982

PROJECT TITLE: Adaptation of hydride AA-system for the arsenic determination of ppb amounts of mercury.

KEY WORDS: Atomic absorption, sodium borohydride, mercury, absorption cell

INVESTIGATOR AND AFFILIATION: P. N. Vijan, I.T.C. Section PV-8201

LIAISON OFFICER OR SUPERVISOR: J. N. Bishop

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE: To adapt the routine hydride-AA set up for arsenic and selenium for determining ultra trace concentrations of mercury in environmental samples. To study the advantages of using sodium borohydride over Stannous chloride-hydroxy/amine hydrochloride as the reducing agents.

EXPLANATION:

The open ended, 10 cm long absorption cell will be made longer by attaching glass tubings to either end. Various lengths of 'T' cells will be tried to achieve the best sensitivity. Effort will be made to make the system capable of multi-purpose use without too many alterations. Stronger reducing power of sodium borohydride will be evaluated for converting organically bound mercury to atomic vapour without intervening oxidative step. Intercomparisons with the existing method will be made and precision and accuracy shall be established. The project will help expand the existing capability.

DURATION OF PROJECT: 1 YEARS — *PRESENT YEAR IS* 1982 YEAR — *REPORTING DATE:* June 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	12000	5000.00	1/2	1/4

SOURCE OF FUNDS: REGULAR WOPE PROGRAM — X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Ministry of the Environment Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-48

BRANCH: Laboratory Services Branch

DATE: June 1, 1982

PROJECT TITLE: Determination of mercury by cold vapour non-dispersive atomic fluorescence spectrometry.

KEY WORDS: Mercury determination: Cold vapour atomic fluorescence, continuous flow system.

INVESTIGATOR AND AFFILIATION: P. N. Vijan, I.T.C. Section PV-8202

LIAISON OFFICER OR SUPERVISOR: J. N. Bishop

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE:

To achieve better sensitivity and freedom from interference from organic vapours in the determination of mercury.

DESCRIPTION:

A simple instrument will be built from a low pressure mercury source, a solar blind photomultiplier, a stablized d.c. EHT supply, a simple direct coupled amplifier and an RC damped pen recorder. The mercury vapour generated in a continuous flow system (PV-8201) will be irradiated with 254 nm mercury line and the atomic fluorescence signal will be recorded. Depending on the success of the system, actual samples will be analysed and precision and accuracy of the method will be established.

DURATION OF PROJECT: 1 YEARS — PRESENT YEAR IS 1982 YEAR — REPORTING DATE: December 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	24000	12000	1	1/2

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

None

REMARKS:

M-A 1291 6/76

Ministry of the Environment

LS-49

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services

DATE: June 30, 1982

PROJECT TITLE:

Development of Microcomputer for Interface with L.I.S. and Local Data Manipulation on I.C.P. Spectrometer.

KEY WORDS: Microcomputer, I.C.P., Data Handling

INVESTIGATOR AND AFFILIATION: David Boomer, I.T.C. Section, D.B. 8201

LIAISON OFFICER OR SUPERVISOR: J. N. Bishop

RESEARCH CATEGORY: INTERNAL -X- GRANT ---- UNSOLICITED CONTRACT ---- SOLICITED CONTRACT ---- MULTI-YEAR PROJECT ---- CONCURRENT PROJECT ----

OBJECTIVE:

To increase the reliability; decrease the sample turnaround time and to extend the capabilities of the existing I.C.P. Spectrometer.

DESCRIPTION:

A PET microcomputer with a printer and disk drive will be used to acquire data from an emission spectrometer. The computer will perform a series of data manipulation tasks whereby quality control, data retrieval and transfer of data to L.I.S. will be handled.

DURATION OF PROJECT: 1 YEARS PRESENT YEAR IS 1 YEAR REPORTING DATE: January 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	12000	6000	1/2	1/4

SOURCE OF FUNDS: REGULAR WORK PROGRAM -X- SPECIAL MINISTRY FUNDING ---- JOINTLY FUNDED PROJECT ---- OTHER ----

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

None

REMARKS:

RMM 1/79 6/76

Ministry of the Environment
Ontario

LS-50

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services

DATE: June 30, 1982

PROJECT TITLE:
Development Of Two Monochromators To Be Added To An Emission Polychromator

KEY WORDS:
ICP/Monochromator

INVESTIGATOR AND AFFILIATION: David Boomer, I.T.C. Section DB 8202

LIAISON OFFICER OR SUPERVISOR: J. N. Bishop

RESEARCH CATEGORY: INTERNAL -X- GRANT ---- UNSOLICITED CONTRACT ---- SOLICITED CONTRACT ---- MULTI-YEAR PROJECT ---- CONCURRENT PROJECT ----

OBJECTIVE:
To extend the capabilities of the existing ICP Spectrometer so that two additional elements may be determined simultaneously with the existing 27. These channels are unique, since they may function as any one of a number of elemental channels whereas the others are fixed.

DESCRIPTION:
Two H.20 monochromators will be purchased from a commercial supplier. The wiring, alignment and development of methodology will be carried out by the principle investigator. An extention of this project will involve the use of these channels as scanning channels for qualitative/semiquantitative analysis.

DURATION OF PROJECT: 1 YEARS PRESENT YEAR IS 1 YEAR REPORTING DATE November 1982

BUDGET:	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	12000	6000	1/2	1/4

SOURCE OF FUNDS: REGULAR WORK PROGRAM -X- SPECIAL MINISTRY FUNDING ---- JOINTLY FUNDED PROJECT ---- OTHER ----

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
None

REMARKS:

Ministry of the Environment
Ontario

LS-51

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services

DATE: June 30, 1982

PROJECT TITLE:
Development Of An Energy Dispersive XRF Method For Air Particulate Analysis

KEY WORDS: Energy Dispersive X-ray, Whatman Filters, Analysis, Metals

INVESTIGATOR AND AFFILIATION: David Boomer DE 8203

LIAISON OFFICER OR SUPERVISOR: J. N. Bishop

RESEARCH CATEGORY: INTERNAL x — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE:

To develop an economical, nondestructive method for the analysis of air particulates suspended on Whatman filters.

DESCRIPTION:

A method of preparing accurate standards will be developed. Excitation conditions and capabilities will be defined using real samples. An intercomparison with existing methodologies will be carried out.

DURATION OF PROJECT: 1 YEARS PRESENT YEAR IS 1 YEAR REPORTING DATE: December 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	12000	6000	1/2	1/4

SOURCE OF FUNDS: REGULAR WORK PROGRAM x — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: None

REMARKS:

Ministry of the Environment
Ontario

LS-52

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Svs & Applied Research Branch, Water Quality *DATE:* May 1, 1982

PROJECT TITLE:
An Analytical Procedure for Organic Carbon in Waters which may or may not contain Suspended Solids.

KEY WORDS:
Organic carbon analysis, River, Wastewater, Suspended Solids

INVESTIGATOR AND AFFILIATION: J. Crowther JC 7501

LIAISON OFFICER OR SUPERVISOR: S. Villard

RESEARCH CATEGORY: *INTERNAL* X *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X *CONCURRENT PROJECT* ——

OBJECTIVE:
To develop an analytical procedure for organic carbon in water, wastes and sewage streams as well as assess present systems.

DESCRIPTION:

Although a number of carbon analyzers are available, none are suitable for high volume analyses of particulate carbon, and the reliability of results has not been sufficiently established.

Available equipment will be evaluated with respect to:

a) scope of carbon analyses

b) stability and rate of performance

c) reliability of results

DURATION OF PROJECT 7 YEARS *PRESENT YEAR IS* 6 YEAR *REPORTING DATE* April, 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$72,000		3	

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: We are waiting for delivery of equipment that is suitable for the determination of V.O.C.

Ministry of the Environment
Ontario

LS-53

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Svs & Applied Research Branch, Water Quality DATE: May 1, 1982

PROJECT TITLE:
Acidity Component Fractionation

KEY WORDS:
Acidity, Precipitation

INVESTIGATOR AND AFFILIATION: F. Tomassini/W. Wright WQS 8002

LIAISON OFFICER OR SUPERVISOR: S. Villard

RESEARCH CATEGORY: INTERNAL -X- GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:
To establish a standard methodology for determining the major acidic components in precipitation samples collected under the APIOS program.

DESCRIPTION:

The following studies will be undertaken with the anticipated result of providing a standard methodology which provides as much information as possible regarding the acidity of precipitation samples:

a) development of an adequate quality control program for acidity

b) determining the effect of various methodologies on the carbonic acid component in precipitation samples.

b) an attempt to differentiate between strong and weak acid contributions to the acidity in precipitation samples.

DURATION OF PROJECT: 3 YEARS PRESENT YEAR IS 2 YEAR REPORTING DATE December 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$18,000	$6,000	3/4	1/2

SOURCE OF FUNDS: REGULAR WORK PROGRAM X SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: A report will be available on parts (a) and (b) by October 1982. Part (c) is still under investigation with no date set for a report.

Ministry of the Environment
Ontario

LS-54

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Svs & Applied Research Branch, Water Quality

DATE: May 1, 1982

PROJECT TITLE:
Asbestos leaching in AC pipes

KEY WORDS: Asbestos, asbestos cement pipe, scanning electron microscope

INVESTIGATOR AND AFFILIATION: P. J. Roberts — WQS 8003

LIAISON OFFICER OR SUPERVISOR: S. Villard

RESEARCH CATEGORY:
INTERNAL X — GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:
To determine the effects of aggressive (low alkalinity/hardness) water on the internal surface of asbestos cement pipe.

DESCRIPTION:
Sections of asbestos cement pipe will be obtained from locations where the asbestos concentration in the water increases after passing through the pipe. The internal surface of the pipe will be compared with unused sections to determine the nature of the damage.

DURATION OF PROJECT: 3 YEARS — PRESENT YEAR IS 2 YEAR — REPORTING DATE June 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$1,680	$1,200	3/4	1/20

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Although no progress was made on this project in the past year, some samples have now been received and the experimental work is fully expected to be completed this year.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-55

BRANCH: Laboratory Svs & Applied Research Branch, Water Quality DATE: May 1, 1982

PROJECT TITLE:
Asbestos Sample Stability and Accuracy of the Interim Method for the determination of Asbestos Fibre Concentrations in Water by Transmission Electron Microscopy.

KEY WORDS: Asbestos, Chrysotile, Amphibole, Talc, Transmission Electron Microscopy, Low Temperature ashing.

INVESTIGATOR AND AFFILIATION: P. J. Roberts PJR 7702

LIAISON OFFICER OR SUPERVISOR: S. Villard

RESEARCH CATEGORY: INTERNAL X GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:
To test the Interim method with U.I.C.C. Chrysotile and Amphibole asbestos suspensions to determine:
a) percentage recovery of fibres when the ashing procedure is incorporated
b) percentage recovery of fibres
c) stability of the suspensions
d) recovery of fibres with and without an ashing procedure in the presence of potential interfering materials.

DESCRIPTION:

Artificial suspensions containing known amounts of chrysotile are prepared and filtered through appropriate filters at various time intervals. The filters are then analyzed with an ashing procedure. Artificial suspensions of chrysotile and talc are mixed and the suspensions filtered and analyzed.

Identical testing procedures are carried out using amphibole asbestos suspensions, with and without ashing.

The accuracy of the method for chrysotile, without using ashing, is to be reported separately.

DURATION OF PROJECT: 4 YEARS PRESENT YEAR IS: 3rd YEAR REPORTING DATE: Dec. 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$24,000	$12,000	1	1/2

SOURCE OF FUNDS: REGULAR WORK PROGRAM X SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: The portion of the project which deals with the percentage recovery of chrysotile asbestos is complete.

MOE 1293 6/76

Ministry of the Environment
Ontario

LS-56

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Svs & Applied Research Branch, Water Quality *DATE:* May 1, 1982

PROJECT TITLE:
The development of analytical techniques for the characterization and quantitation of synthetic and naturally occuring mineral fibres in Ontario (excluding Asbestos).

KEY WORDS: Glass fibre, Zeolites, amphiboles, SEM, TEM, EDX, SAED, XRF

INVESTIGATOR AND AFFILIATION: P. J. Roberts PJR 7901

LIAISON OFFICER OR SUPERVISOR: S. Villard

RESEARCH CATEGORY:
INTERNAL —X— *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
1. To compile physical and chemical properties of fibrous materials and minerals of commercial importance or Environmental Health Significance.
2. To develop analytical (techniques) procedures to identify and distinguish between mineral species.

DESCRIPTION: There is increasing evidence that mineral fibres other than asbestos are capable of producing mesothelioma and other "asbestos-related" diseases in laboratory animals and most recently humans. Since asbestos was first recognized as a human carcinogen efforts have been made to find substitutes for its many applications, the most notable being glass fibre. Unfortunately glass fibre has also been found to produce toxic symptoms in laboratory animals and while the search continues for suitable safe substitutes for asbestos it is timely for analytical methods to be developed to characterize and quantitatively determine the spectrum of mineral fibres of commercial or possible commercial importance.

Approach:
1. To collect samples (about 80) of known fibrous mineral deposits in Ontario and fibrous materials that are used commercially.
2. To characterize those fibrous materials by SEM, TEM and SAED. Special attention will be paid to distinguish those minerals which may interfere with asbestos identification.
3. To explore the feasibility of employing an image analysis system for positive identification of minerals.

DURATION OF PROJECT: 4 YEARS *PRESENT YEAR IS* 4th YEAR *REPORTING DATE:* Dec. 1983

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
$24,000	$6,000	1	1/4

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
Natural Resources and Labour may be requested to assist in sample collection.

REMARKS: Two summer students working on Experience '81 and '82 projects have participated in this work. A report entitled "An Atlas of fibreglass and rockwool" describes the results of the 1981 study.

Ministry of the Environment
Ontario

LS-57

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Svs & Applied Research Branch, Water Quality *DATE:* May 1, 1982

PROJECT TITLE:
Controller for an Automated Ion Chromatograph System

KEY WORDS: Controller, automation, ion chromatograph

INVESTIGATOR AND AFFILIATION: M. W. Rawlings MWR 8001

LIAISON OFFICER OR SUPERVISOR: S. Villard

RESEARCH CATEGORY: *INTERNAL* —X— *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
To design and implement a controller for the ion chromatography which will time and control sample injection and a multi-place sampler; will initiate a regeneration cycle at the end of a run; will release the peristaltic pump; will turn off the chart recorder.

DESCRIPTION:
The key to efficient ion chromatography for the Precipitation Lab is automated runs long enough to use the full capacity of the columns. Since this involves after hours running, a system capable of regenerating the columns and shutting down the equipment is required.

A PET microcomputer will be used to generate the timing and control signals. The control signals will be transmitted via solid state relays. The circuitry will be our design. The chromatographic column valves will be controlled by electrically operated 3-way solenoid valves.

DURATION OF PROJECT: 2 YEARS *PRESENT YEAR IS* 2nd YEAR *REPORTING DATE* August 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$6,000	$6,000	1/4	1/4

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Practical work has been completed; the controller is in routine use in the Rivers and Lakes Lab, and is working well.

Ministry of the Environment
Ontario

LS-58

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Svs & Applied Research Branch, Water Quality *DATE:* May, 1982

PROJECT TITLE:
Construction of a microprocessor controlled ion chromatograph.

KEY WORDS: ion chromatograph

INVESTIGATOR AND AFFILIATION: F. Tomassini/M. Rawlings WQS 8101

LIAISON OFFICER OR SUPERVISOR: S. Villard

RESEARCH CATEGORY:
INTERNAL —X— *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

1. To construct initially, a manually operated ion chromatograph from readily available components, having the sensitivity & precision of commercially available units but at a substantial cost saving.

2. To automate the unit to achieve the best possible throughput with the least amount of operator time. Note: The completion of this task is directly dependent on the success of project MWR 8001.

DESCRIPTION:

The use of ion chromatography as an analytical method has gained wide acceptance in recent years, particularly for the analysis of low ppm levels of SO_4 in precipitation samples and surface waters. Commercially available units are prohibitively expensive to be considered as a routine methodology for a high capacity laboratory. This project will attempt to construct an ion chromatograph from commercially available components. The cost effectiveness of this project will be realized with the construction of more than one system & its success will make ion chromatography accessible to the regional laboratories.

DURATION OF PROJECT: 3 YEARS *PRESENT YEAR IS:* 2 YEAR *REPORTING DATE:* Dec. 31, 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$18,000	$12,000	3/4	1/2

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: The construction of the ion chromatographic unit has been completed with the exception that the injection valve is manually actuated. The A/D converter section of the controller is being held up by parts non-availability.

Ministry of the Environment
Ontario

LS-59

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Svs & Applied Research Branch, Water Quality DATE: May 1, 1982

PROJECT TITLE: Determination of Bromide by Ion Chromatography

KEY WORDS: Bromide, ion chromatography, precipitation

INVESTIGATOR AND AFFILIATION: W. Wright JC 7902

LIAISON OFFICER OR SUPERVISOR: S. Villard

RESEARCH CATEGORY: INTERNAL X GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE: To determine bromide at ppb levels in precipitation samples.

DESCRIPTION:

Bromide is normally present in automobile exhausts and should serve as a tracer for this type of manmade pollution. Bromide will be determined in aqueous samples by ion chromatography after having pretreated the samples to reduce interferences such as nitrate which may also be present.

DURATION OF PROJECT: 3 YEARS PRESENT YEAR IS 3 YEAR REPORTING DATE: Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$10,000	$10,000	1/2	1/2

SOURCE OF FUNDS: REGULAR WORK PROGRAM X SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: This project has been turned over to another investigator due to retirement and a new literature search has been initiated.

Ministry of the Environment
Ontario

LS-60

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Svs & Applied Research Branch, Water Quality *DATE:* May 1, 1982

PROJECT TITLE:
An In-Depth Review of the Entire Chlorophyll Procedure

KEY WORDS: Chlorophyll

INVESTIGATOR AND AFFILIATION: M. Rawlings; W. B. Moody FPD 7802

LIAISON OFFICER OR SUPERVISOR: S. Villard

RESEARCH CATEGORY: *INTERNAL* —X— *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
Objective: To determine precision limiting steps in the existing procedure; to improve the throughput time by examining alternative maceration procedures; to investigate alternative analytical methods and preservation techniques.

DESCRIPTION:
The present procedure is not very precise. Acidification to obtain corrected Chylorophyll a often provides anomolous results. The procedure presently being used is time consuming with some problems observable. The effect of the preservation and/or natural turbidity of filtered extracts on analytical results needs to be investigated.

The entire test procedure is being examined. New maceration techniques will be investigated. Preservation techniques will be examined to clarify the amount of $MgCO_3$ necessary for preservation and its effect on chlorophyll and acidified chlorophyll results.

DURATION OF PROJECT: 3 YEARS *PRESENT YEAR IS* 3 YEAR *REPORTING DATE:* Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$12,000	$6,000	1/2	1/4

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: A preliminary report will be issued about 1 July 82. This should be distributed to field chiefs for their comments. If they are not receptive to the proposed changes, the project will be finished off with a final report, which will include QC data, being issued by 1 January, 1983.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-61

BRANCH: Laboratory Svs & Applied Research Branch, Water Quality DATE: May 1, 1982

PROJECT TITLE:
Investigation of Flow Injection Analysis (FIA) Systems and Methods

KEY WORDS: Flow Injection Analysis

INVESTIGATOR AND AFFILIATION: J. Crowther FPD 7801

LIAISON OFFICER OR SUPERVISOR: S. Villard

RESEARCH CATEGORY: INTERNAL —X— GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:
To evaluate Flow Injection Analysis Methods and define their potential use in the Water Quality Section.

DESCRIPTION:
FIA methods are reputed to be up to 40 times faster than normal segmented stream analytical methods used on Technicon Colorimetric equipment. A variety of detectors are also available for Colorimetric, potentiometric, conductimetric and spectrophotometric analyses.

The approach will be to test theoretical principles and instrumentation available (very limited supply available) and use existing colorimetric methods to confirm speed of analysis and determine variables associated with adopting this new technique for routine testing.

DURATION OF PROJECT: 4 YEARS PRESENT YEAR IS 4 YEAR REPORTING DATE: April 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	10,000	$8,000	5/12	1/3

SOURCE OF FUNDS: REGULAR WORK PROGRAM X —— SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:
A concept has been shown to be chemically feasible, we are currently trying to construct an apparatus that is precise, accurate, and rugged.

Ministry of the Environment
Ontario

LS-62

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Svs & Applied Research Branch, Water Quality DATE: May 1, 1982

PROJECT TITLE:
Phenols: Recovery and Efficiency of Existing 4-AAP Method

KEY WORDS:
Phenols, Recovery of 4-AAP Method for Phenols

INVESTIGATOR AND AFFILIATION: W. B. Moody FPD 7503

LIAISON OFFICER OR SUPERVISOR: S. Villard

RESEARCH CATEGORY: INTERNAL —X— GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:
A recovery of various phenols by our present 4-AAP method.

DESCRIPTION:

Various authors report different recoveries with 4-AAP methods for phenolics. Our method requires documentation of recoveries.

Various phenolics will be collected and analyzed using our present method. Special emphasis will be placed on chlorophenols since they may contribute to taste and odor problems. Focus will also be placed on the concensus voluntory reference compounds (CVRC's) as approved by the ACS Division of Environmental Chemistry.

DURATION OF PROJECT: 6 1/2 YEARS PRESENT YEAR IS 6 YEAR REPORTING DATE: April 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$15,600	$10,000	1/4	5/12

SOURCE OF FUNDS: REGULAR WORK PROGRAM X —— SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Work on this project will commence on or about 1 July 1982. The final report with recommendations should be available by 1 January 83.

MOA 1291 6/76

Ministry of the Environment
Ontario

LS-63

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Svs & Applied Research Branch, Water Quality DATE: May 1, 1982

PROJECT TITLE: Biological Oxygen Demand Measurements

KEY WORDS: BOD_5, Ultimate BOD, K-Rates, Probes, DO Measurements

INVESTIGATOR AND AFFILIATION: J. Crowther/B. Cheung WQS 8005

LIAISON OFFICER OR SUPERVISOR: S. Villard

RESEARCH CATEGORY: INTERNAL X GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE: To expand the scope and improve the quality of biological oxygen demand measurements.

DESCRIPTION:

Background: (1) BOD_5 procedure has not been checked out for a number of years, and quick checks recently indicated problems with (2) DO measurements. (3) K-Rates, by the manual procedures, are so time consuming that the lab cannot meet field requirements (4) blanking systems for BOD_5 analyses have appeared in the literature, (5) NOD data has proven necessary for some field studies.

Approach:

(1) Step by step check of BOD_5 procedure for both clean and dirty samples.
(2) Evaluate DO techniques & improve QC procedures.
(3) Semi-automate ultimate BOD and K-Rate procedures.
(4) Evaluate blank correction techniques.
(5) Develop data bank for NOD measurements and evaluate current techniques.

DURATION OF PROJECT: 4 YEARS PRESENT YEAR IS 3 YEAR REPORTING DATE: April 1982

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
$24,000	$8,000	1	1/3

SOURCE OF FUNDS: REGULAR WORK PROGRAM X SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: We are evaluating EBOD apparatus for determination of K-Rates and ultimate BOD of industrial wastes and sewage.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-64

BRANCH: Laboratory Svs & Applied Research Branch, Water Quality DATE: Jan. 15/82

PROJECT TITLE:
Automated Procedure for the Determination of True Colour in Hazen Units.

KEY WORDS: True Colour, Hazen Units, Automation

INVESTIGATOR AND AFFILIATION: B. Cheung, Sewage and Industrial Wastes WQS 8201

LIAISON OFFICER OR SUPERVISOR: J. Crowther

RESEARCH CATEGORY: Requested INTERNAL — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE:
To determine true colour in Hazen Units via continuous flow analysis; the system is to utilize a reference channel to compensate for sample turbidity.

DESCRIPTION:

1. Most major laboratories analyze for true colour, and most water criteria refer to true colour. Ontario is expected to include true colour criteria within a few years; unless an automated system is available, true colour determinations will be labour intensive. Furthermore, existing data shows that some people do not differentiate between true and apparent colour.

2. The current procedure for the determination of apparent colour in Hazen units utilizes two broad band filters with the second filter required for partial correction of turbidity effects. This type of system is to be automated, and a reference channel is to be developed such that it gives full compensation for particulates in samples.

DURATION OF PROJECT: 1 YEARS PRESENT YEAR IS 1982 YEAR REPORTING DATE: Winter, 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$7,920	$6,960	33/100	29/100

SOURCE OF FUNDS: Internal REGULAR WORK PROGRAM X SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Yes, available on request.

PARTICIPATION BY OTHER MINISTRIES: No.

REMARKS: We are evaluating capacity of equipment (automated) with respect to capacity to compensate for particulates, i.e. give true colour estimate in the presence of turbidity.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-65

BRANCH: Laboratory Svs & Applied Research Branch, Water Quality

DATE: March 26, 1982

PROJECT TITLE:
Low level Fluoride measurement by Ion Specific Electrode.

KEY WORDS: Fluoride, Ion specific electrode.

INVESTIGATOR AND AFFILIATION: S. Barnes — WQS 8202

LIAISON OFFICER OR SUPERVISOR: S. Villard

RESEARCH CATEGORY:
INTERNAL X — UNSOLICITED CONTRACT — — MULTI-YEAR PROJECT —
GRANT — — SOLICITED CONTRACT — — CONCURRENT PROJECT —

OBJECTIVE:
To develop a method for the measurement of fluoride in the microgram per liter range, in low ionic strength samples.

DESCRIPTION:
A Technicon Ion specific Electrode Module in conjunction with a compatible fluoride electrode system is employed in an automated system to measure total fluoride in the 0 - 50 µg/L range. No sample preparation is necessary and only a single reagent (total Ionic strength adjustment buffer) is required for the analysis.

DURATION OF PROJECT: 0.5 YEARS — PRESENT YEAR IS: 1st YEAR — REPORTING DATE: June 1982

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
$1,992	$1,992	1/8	1/8

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — — JOINTLY FUNDED PROJECT — — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
No

REMARKS: The method is being developed in response to a request by the Limnology and Toxicity Section in order that a speciation model for aluminum in waters subject to acidic precipitation can be developed.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-66

BRANCH: Laboratory Svs & Applied Research Branch, Water Quality *DATE:* May 25, 1982

PROJECT TITLE:
The Development and Implementation of a Method and Quality Control Procedure for the Analysis of Tritium in Drinking Water.

KEY WORDS: Tritium, analysis, water

INVESTIGATOR AND AFFILIATION: P. J. Roberts WQS 8203

LIAISON OFFICER OR SUPERVISOR: S. Villard

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
To implement an analytical method for tritium to test for compliance with the target levels established in the Drinking Water Guidelines promulgated by Health and Welfare Canada.

DESCRIPTION:
Spiked samples will be used to obtain a counting efficiency curve for the liquid scintillation counters. Quality control parameters such as accuracy, precision, detection limit and detection criterion will be determined for the operating conditions as they are optimized.

DURATION OF PROJECT: 1 YEARS *PRESENT YEAR IS* 1 YEAR *REPORTING DATE* March 31, 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$4,800	$4,800	1/5	1/5

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
None

REMARKS: Some preliminary work has been completed in the previous year.

Ministry of the Environment
Ontario

LS-67

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Svs & Applied Research Branch, Water Quality DATE: May 31, 1982

PROJECT TITLE:
The Development and Implementation of a Method and Quality Control Procedure for the Analysis of Lead-210 in Sediments

KEY WORDS: Lead, analysis, sediments

INVESTIGATOR AND AFFILIATION: P. J. Roberts — WQS 8204

LIAISON OFFICER OR SUPERVISOR: S. Villard

RESEARCH CATEGORY: INTERNAL —X— GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:
To implement an analytical procedure for lead-210 in sediments for use in studies of sedimentation rates and sediment dating.

DESCRIPTION:
Spiked samples will be used to obtain a calibration curve for the alpha spectrometer. Quality control parameters such as recovery, precision, detection limit and detection criterion will be determined as the operating conditions are optimized.

DURATION OF PROJECT: 1 YEARS — PRESENT YEAR IS 1st YEAR — REPORTING DATE: March 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$4,800	$4,800	1/5	1/5

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: New project

Ministry of the Environment
Ontario

LS-68

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES, PESTICIDES SECTION *DATE:* April 1, 1982

PROJECT TITLE: High-performance liquid chromatographic analysis of polar pesticides and metabolites

KEY WORDS: High-performance liquid chromatography (HPLC),analysis, pesticides

INVESTIGATOR AND AFFILIATION: P. Baulu, Pesticides Section

LIAISON OFFICER OR SUPERVISOR: G.A.V. Rees

RESEARCH CATEGORY: *INTERNAL* X *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X *CONCURRENT PROJECT* ——

OBJECTIVE: To develop analytical procedures for polar pesticides in environmental samples, using high-performance liquid chromatography (HPLC).

DESCRIPTION:

Gas chromatography (GLC) has been the preferred method of detection of pesticides, but HPLC is proving useful for analysis of pesticides not detectable by GLC

The initial step will be to optimize HPLC conditions for carbamate analysis using various detector wavelengths in the U.V. range and several solvent combinations on different types of columns.

Use of the HPLC will then be extended to analysis of other pesticides and metabolites.

DURATION OF PROJECT: on-going YEARS *PRESENT YEAR IS* 3rd YEAR *REPORTING DATE* Sept./82

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$24,000	$8,000	1	1/3

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? yes

PARTICIPATION BY OTHER MINISTRIES: no

REMARKS: April 1,1982: Clean-up of water samples on Florisil prior to carbamate and phenyl-urea determinations is now done routinely. QC data will be documented with every set of samples. Clean-up was proven necessary during testing of real samples using the HPLC procedure we developed.

MAR 1204 6/76

Ministry of the Environment
Ontario

LS-69

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES, PESTICIDES SECTION

DATE: April 1, 1982

PROJECT TITLE:
Use of automated clean-up system for PCB analysis in fish

KEY WORDS: automation - clean-up - fish - PCB's - pesticides

INVESTIGATOR AND AFFILIATION: Y. Jones, & P. Baulu, Pesticides Section

LIAISON OFFICER OR SUPERVISOR: G.A.V. Rees

RESEARCH CATEGORY:
INTERNAL x — UNSOLICITED CONTRACT — MULTI-YEAR PROJECT x
GRANT — SOLICITED CONTRACT — CONCURRENT PROJECT —

OBJECTIVE:

Evaluate and automate column chromatographic procedure for clean-up and separation of PCB's and organochlorinated pesticides in fish.

DESCRIPTION:

Evaluate several columns for recovery and separation of PCB's and organochlorine compounds.

- evaluate the clean-up efficiency of each column
- automate system by addition of switching valve, automatic sampler and fraction collector.

DURATION OF PROJECT: on-going YEARS — PRESENT YEAR IS 5th YEAR — REPORTING DATE unknown

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$ 48,000	$ 2,400	2	1/10

SOURCE OF FUNDS:
REGULAR WORK PROGRAM x — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Preliminary report available in 1981

PARTICIPATION BY OTHER MINISTRIES:
no

REMARKS: April 1, 1982: Preliminary report available; amino-silane columns (micro-N H_2) have been shown to separate PCB's from OC's. An attempt to regenerate the column appears successful. Further testing of column-life is required before implementation.

MOE 1292 6/76

Ministry of the Environment
Ontario

LS-70

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES, PESTICIDES SECTION DATE: April 1, 1982

PROJECT TITLE: Development of analytical methodology for analysis of chlorodibenzofurans and dioxins in environmental samples

KEY WORDS: Analysis, dioxin, GC/MS, water, fish, sediment, air, capillary, GC/MS

INVESTIGATOR AND AFFILIATION: H. Tosine, Pesticides Section

LIAISON OFFICER OR SUPERVISOR: G.A.V. Rees

RESEARCH CATEGORY: INTERNAL x — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT x — CONCURRENT PROJECT —

OBJECTIVE:

To devise, test and utilize isolation, cleanup and detection of chlorodibenzofurans and dioxins in air, water, fish, sediment and chemical landfill sites.

DESCRIPTION:

The analysis of complex environmental samples for furans and dioxins is complicated by interfering hydrocarbons and other chlorinated congeners. A method will be developed which will quickly and efficiently clean up and separate the chlorinated furans and dioxins from interferences. The chromatographic clean up will be complemented by capillary GC/MS, providing a refined separation of the isomers of the furans and dioxins for quantitation by computer.

DURATION OF PROJECT: 2 YEARS PRESENT YEAR IS 2nd YEAR REPORTING DATE October 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$24,000	$8,000	1	1/3

SOURCE OF FUNDS: REGULAR WORK PROGRAM x — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? In MOE methods manual

PARTICIPATION BY OTHER MINISTRIES: no

REMARKS:

April 1, 1982: A method for analysis of PCDD's and PCDF's in fly ash has been developed and will be published in the MOE methods manual. Evaluation of analytical procedures for PCDD and PCDF determination in sediments is in progress.

MOE 1209 6/76

Ministry of the Environment
Ontario

LS-71

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES BRANCH, PESTICIDES SECTION DATE: April 1, 1982

PROJECT TITLE: Development of high resolution capillary G.C. methodology for the analysis of chlorinated industrial organics

KEY WORDS: Chlorinated industrial organics - high resolution capillary GC

INVESTIGATOR AND AFFILIATION: J. Osborne, Pesticides Section

LIAISON OFFICER OR SUPERVISOR: G.A.V. Rees

RESEARCH CATEGORY: INTERNAL X | GRANT — | UNSOLICITED CONTRACT — | SOLICITED CONTRACT — | MULTI-YEAR PROJECT X | CONCURRENT PROJECT —

OBJECTIVE:

To investigate the use of high resolution capillary columns for the analysis of complex industrial organic waste samples. If proven feasible, the capillary columns will be incorporated into the automatic gas chromatographic instruments for routine analysis.

DESCRIPTION:

The regular packed gas chromatographic columns do not have the required resolving capabilities for the analysis of complex industrial waste samples. It is proposed to evaluate specific capillary columns of various lengths for:

(a) analysis of complex halogenated organic wastes in environmental samples

(b) suitability for automated analysis

DURATION OF PROJECT: 3 YEARS | PRESENT YEAR IS 2nd YEAR | REPORTING DATE 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$48,000	$8,000	2	1/3

SOURCE OF FUNDS: REGULAR WORK PROGRAM x | SPECIAL MINISTRY FUNDING — | JOINTLY FUNDED PROJECT — | OTHER —

IS A REPORT ANTICIPATED? yes

PARTICIPATION BY OTHER MINISTRIES: no

REMARKS:

April 1, 1982: Capillary G.C. methodology is in routine use for analysis of chlorophenoxy acids, chlorophenols and chlorinated aromatics. It is expected that cap. G.C. will be extended to analysis of other classes of organic contaminants with the expected acquisition of element-selective detectors.

MIN 1293 6/76

Ministry of the Environment
Ontario

LS-72

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES BRANCH, PESTICIDES SECTION *DATE:* April 1/82

PROJECT TITLE: Evaluation of capillary GC for routine fish contamination monitoring

KEY WORDS: Capillary columns, electron capture, fish analysis

INVESTIGATOR AND AFFILIATION: J. Osborne, and G. Crawford, Pesticides Section

LIAISON OFFICER OR SUPERVISOR: G.A.V. Rees

RESEARCH CATEGORY: *INTERNAL* X — *GRANT* — — *UNSOLICITED CONTRACT* — — *SOLICITED CONTRACT* — — *MULTI-YEAR PROJECT* X — *CONCURRENT PROJECT* —

OBJECTIVE:

To investigate the feasibility of using capillary columns for the routine analysis of pesticides, herbicides and other halogenated organics in fish

DESCRIPTION:

Due to the low resolving capability of packed GC columns, interfering materials may not be fully separated from the compounds of interest. Accordingly, the results reported may not be the true value due to presence of these interferences. By use of the capillary columns it may be possible to fully resolve these interferences and provide a more accurate result.

A comparison will be made of the results obtained from fish extracts analysed on both packed and capillary columns for PCB's and other halogenated environmental contaminants.

DURATION OF PROJECT: 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* unknown

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$12,000	$4,000	½	1/6

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* x — *SPECIAL MINISTRY FUNDING* — — *JOINTLY FUNDED PROJECT* — — *OTHER* —

IS A REPORT ANTICIPATED? yes

PARTICIPATION BY OTHER MINISTRIES: no

REMARKS:

April 1, 1982: Several commercially available capillary columns have been evaluated for performance (separation efficiency, resolution, sample load volume). The HP-OV1 bonded phase appears to be the most suitable. An evaluation of repeatability and linearity will be performed next.

MOE 1293 6/76

Ministry of the Environment
Ontario

LS-73

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES, PESTICIDES SECTION

DATE: April 1, 1982

PROJECT TITLE: Multi-component cartridges for sampling and analysis of trace organics in air.

KEY WORDS: Analysis, air, organic contaminants

INVESTIGATOR AND AFFILIATION: J. Osborne, Pesticides Section

LIAISON OFFICER OR SUPERVISOR: G.A.V. Rees

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT X — CONCURRENT PROJECT —

OBJECTIVE:

To evaluate a multi-component cartridge for sampling and analysis of air for various classes of organic trace contaminants

DESCRIPTION:

A combined Carbosieve and Florisil cartridge has been designed. Preliminary tests will determine the efficiency of a thermal cleaning procedure for the cartridge packing. If this proves satisfactory, a recovery study will be conducted by spiking cartridges, pumping air through and eluting with solvent to recover OC's, PCB's and chlorinated aromatics.
This methodology will then be extended to other classes of pesticides and organic trace contaminants.

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS 1st YEAR — REPORTING DATE 1984

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$16,000	$8,000	2/3	1/3

SOURCE OF FUNDS: REGULAR WORK PROGRAM — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT x ARB/LSB — OTHER —

IS A REPORT ANTICIPATED? yes

PARTICIPATION BY OTHER MINISTRIES: no

REMARKS:

MOE 1793 6/76

Ministry of the Environment
Ontario

LS-74

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES, PESTICIDES SECTION *DATE:* April 1, 1982

PROJECT TITLE: Extension of HCl digestion/extraction of fish tissues for the analysis of organic pollutants

KEY WORDS: Acid, HCL, digestion, herbicides, organic pollutants

INVESTIGATOR AND AFFILIATION: George Crawford, Pesticides Section

LIAISON OFFICER OR SUPERVISOR: G.A.V. Rees

RESEARCH CATEGORY: *INTERNAL* x *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To extend the use of an acid extraction/digestion procedure to the analysis of fish and biota for herbicide residues and organic pollutants.

DESCRIPTION: This acid digestion has proven effective for PCB/OC analysis in fish. The intention is to expand its use to analysis of other pesticides such as chlorophenoxy acids and triazines as well as to chlorophenols and chlorinated aromatics.

DURATION OF PROJECT: 1 YEARS *PRESENT YEAR IS* 1st YEAR *REPORTING DATE* Oct. 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$12,000	$6,000	½	½

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* x —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? yes

PARTICIPATION BY OTHER MINISTRIES: no

REMARKS:

Ministry of the Environment
Ontario

LS-75

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES - PESTICIDES SECTION *DATE:* April 1, 1982

PROJECT TITLE: Investigation of the seasonal variation of PCB and Organochlorines in Lake Ontario Lake Trout

KEY WORDS: PCB/Organochlorines/ Lake trout/Lake Ontario/Variation

INVESTIGATOR AND AFFILIATION: Mike Whittle, CCIW Burlington

LIAISON OFFICER OR SUPERVISOR: G.Crawford, Pesticides Section

RESEARCH CATEGORY: *INTERNAL* X *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE: To evaluate the seasonal variation of PCB and Organochlorines in tissues of Lake Ontario Lake trout and to determine areas of translocation if any, during one annual cycle. All trout to be of same year class to eliminate age differences.

DESCRIPTION:

Suitable fish will be secured by staff of CCIW under direction of M. Whittle. Selected tissues will be removed, mascerated and submitted to OME for analysis of routine PCB and Organochlorines including lipid.

Results will be documented and forwarded to M. Whittle for compilation and investigation. Meaningful results will result in a joint publication.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* October 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$8,000	$8,000	1/3	1/3

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? yes

PARTICIPATION BY OTHER MINISTRIES: CCIW

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

LS-76

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES BRANCH - PESTICIDES SECTION DATE: April 1, 1982

PROJECT TITLE:

Occurrence of PCDDS/PCDFS in incineration source samples

KEY WORDS:

PCDD, PCDF, stack samples, incineration samples

INVESTIGATOR AND AFFILIATION: Helle Tosine, Pesticides Section

LIAISON OFFICER OR SUPERVISOR: G.A.V. Rees

RESEARCH CATEGORY:

INTERNAL x	UNSOLICITED CONTRACT —	MULTI-YEAR PROJECT x
GRANT —	SOLICITED CONTRACT —	CONCURRENT PROJECT —

OBJECTIVE:

To develop a methodology for efficient extraction and clean-up of incineration samples for ppt levels of PCDDS/PCDFS; To develop automated software for the GC/MS analysis, quantitation and confirmation of PCDDS/PCDFS in these samples; To analyse all parts of incineration source samples from 3 Ontario sites for PCDDS/PCDFS.

DESCRIPTION:

As part of a joint MOE (LSB AND ARB) and Ministry of Energy project, three incineration sources will be tested for chlorinated organics: PCDDS, PCDFS, chlorophenols, chlorinated aromatics and PCBS. This project involves extensive method development for the efficient clean-up and fractionation of these samples for the range of chlorinated organics listed. Also, extensive software must be written to provide automated confirmation and quantitation by GC/MS for the entire range of PCDDS & PCDFS.

DURATION OF PROJECT: 2 YEARS — PRESENT YEAR IS 1st YEAR — REPORTING DATE: Oct. 1984

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$24,000	$12,000	1	½

SOURCE OF FUNDS:

REGULAR WORK PROGRAM x	SPECIAL MINISTRY FUNDING —	JOINTLY FUNDED PROJECT —	OTHER —

IS A REPORT ANTICIPATED? yes

PARTICIPATION BY OTHER MINISTRIES:

Ministry of Energy

REMARKS:

Ministry of the Environment
Ontario

LS-77

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services & Applied Research *DATE:* November 1981

PROJECT TITLE: A Novel Extraction Technique for Priority Pollutants Utilizing Very Small Quantities of Solvents

KEY WORDS: extraction - priority pollutants

INVESTIGATOR AND AFFILIATION: O. W. Berg, OTC Section

LIAISON OFFICER OR SUPERVISOR: Dr. O. Meresz

RESEARCH CATEGORY: *INTERNAL* X — *GRANT* — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:

To develop efficient extraction techniques for the determination of organic micro-pollutants.

DESCRIPTION:

The work-up of the solvent extract would be easier if the extracts were samll in volume. This can be accomplished with solvents lighter than water and with the following extractor. A one-litre Teflon bottle is etched internally with an active sodium compound in order to make it hydrophilic. It is equipped with a special screw-on adapter consisting of a Teflon screw cap and 5 x 60 mm glass tube. After thorough shaking of the sample with solvent, the adapter is attached to the bottle, and the bottle is squeezed. The extract then flows into the adapter where it can be removed from with a syringe.

DURATION OF PROJECT: 1 *YEARS* *PRESENT YEAR IS:* 1 *YEAR* *REPORTING DATE:* End of 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	2,500	1,000		0.5

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? Yes, internal.

PARTICIPATION BY OTHER MINISTRIES: No.

REMARKS:

Ministry of the Environment
Ontario

LS-78

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services & Applied Research *DATE:* January 1980

PROJECT TITLE: The Use of the Kenics Mixer in Fast Analytical Extractions

KEY WORDS: extraction - organics - Kenics mixer - fast

INVESTIGATOR AND AFFILIATION: O. W. Berg, OTC Section

LIAISON OFFICER OR SUPERVISOR: Dr. O. Meresz

RESEARCH CATEGORY: *INTERNAL* X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE: To develop a fast and efficient extractor which is less labour intensive than those based on the standard separatory funnels.

DESCRIPTION: The Kenics mixer is widely used in the chemical industry for mixing/blending purposes. The model 316, 3/16 x 10" is used in this study. The project consists of two main parts:

1. Design and Construction of the Contactor
   The main principle in the design of the contactor involves the use of compressed air to move both the solvent and the sample. The contactor is mounted on a console, and the operator involvement is confined to the attachment of the sample bottle to an adapter and opening a valve.

2. Design of Fast Phase Separator
   A variety of phase separator designs will be considered. The static type will be investigated first. These types will involve the coagulation of the two-phase system on Teflon shavings, and in cyclone-type separators.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 3 *YEAR* *REPORTING DATE* 1985

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	7,500	2,500	1	0.33

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Internal.

PARTICIPATION BY OTHER MINISTRIES: No.

REMARKS: July 23, 1982. The contactor has been designed and built. The first attempts to design a fast, static phase separator have failed.

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-79

BRANCH: Laboratory Services & Applied Research *DATE:* April 1981

PROJECT TITLE: Automated Extraction of Water Samples for the Analysis of Priority Pollutants

KEY WORDS: automation - extraction - water - priority pollutants

INVESTIGATOR AND AFFILIATION: O. W. Berg, OTC Section

LIAISON OFFICER OR SUPERVISOR: Dr. O. Meresz

RESEARCH CATEGORY:
INTERNAL X *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE: To develop an automated procedure for extraction of priority from water samples in order to free staff in critical areas of the section.

DESCRIPTION: This project is the 2nd phase of a project entitled "Automated Extraction of Water for Analysis of Organochlorine Pesticides and Polychlorinated Biphenyls. This 1st phase was successfully concluded in 1981 in the Pesticides Section and reported on at the Pittsburg conference in 1981. In order to adopt the extractor to the priority pollutant analysis, the following areas will be explored:

1. Electrical Design
   In order to make the termination and other variables of the timing cycle independent of the operator's judgement, electronic sensors will be developed. Both conductive and capacitative sensors will be designed and tested.

2. Hydraulic System
   The system will be optimized for the extraction of organics with considerably less favourable partition coefficients than those of the organochlorine pesticides and PCB's.

DURATION OF PROJECT: 2 YEARS *PRESENT YEAR IS* 2 YEAR *REPORTING DATE* 1984

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	4,000	800		0.8

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes, internal report.

PARTICIPATION BY OTHER MINISTRIES: No.

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

LS-80

BRANCH: Laboratory Services & Applied Research *DATE:* May 1982

PROJECT TITLE: Design of a Continuous Purging Apparatus for the Concentration of Mal-odorous Organics in Water

KEY WORDS: purging - apparatus - continuous - organics - water - adsorbent

INVESTIGATOR AND AFFILIATION: O. W. Berg, OTC Section

LIAISON OFFICER OR SUPERVISOR: Dr. O. Meresz

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE: To develop a rugged field apparatus for the continuous trapping of volatile organic substances causing odour problems in potable water.

DESCRIPTION: The projects involves the design and testing of an apparatus based on the concepts developed by Dr. Meresz. It involves the use of air for the continuous purging of water running through the device. The airstream is purified with a charcoal filter, and the odorous components are trapped on a solid adsorbent. In subsequent laboratory work, the organics are removed from the solid adsorbent by thermal desorption or by solvent extraction for characterisation and identification.

DURATION OF PROJECT: 0.5 YEARS *PRESENT YEAR IS* 1 YEAR *REPORTING DATE:* September 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	3,000	1,500		3,000

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Internal followed by publication of results.

PARTICIPATION BY OTHER MINISTRIES: No.

REMARKS: July 23, 1982. The apparatus has been designed, and the hydraulic stream have been adjusted. Chemical trials with model compounds such as peppermint oil are in progress.

Ministry of the Environment
Ontario

LS-81

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services & Applied Research *DATE:* May 1982

PROJECT TITLE: Development of Novel Techniques for the Quantitative Recovery of Priority Pollutants from Solvent Extracts.

KEY WORDS: priority pollutants - recovery - solvent - extracts

INVESTIGATOR AND AFFILIATION: O. W. Berg, OTC Section

LIAISON OFFICER OR SUPERVISOR: Dr. O. Meresz

RESEARCH CATEGORY: *INTERNAL* X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE: To develop novel techniques to prevent losses of medium-volatile organics from solvent extracts during the removal of excess of solvent.

DESCRIPTION: Based on classical physical chemistry concepts of equilibria in solvent-solute systems, low varieties of diffusion cells will be constructed and tested for the concentration of the solvent extracts. A concentration factor of about 100 will be considered.

1. Thermal Diffusion
   A "hot-cold wall" cell will be constructed and tested. The solvent vapour will diffuse against a cold surface, (cooled electrically by the Peltier effect) where it will condense. It is remvoed from the diffusion cell by gravity.

2. Air-Flow Cell
   A solvent removal cell will be constructed in such a manner that a stream of nitrogen, under pseudo-equilibrium conditions, will remove the solvent vapours thus concentrating the extract.

DURATION OF PROJECT: 1 YEARS *PRESENT YEAR IS* 1 YEAR *REPORTING DATE* April 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	4,000	4,000		0.4

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Internal report.

PARTICIPATION BY OTHER MINISTRIES: No.

REMARKS: July 23, 1982. The two cells described above have been designed and analytical tests are in progress.

Ministry of the Environment
Ontario

LS-82

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Laboratory Services & Applied Research *DATE:* August 1982

PROJECT TITLE: A Novel Field Sampler for Atmospheric Pollutants

KEY WORDS: dew point - artefact-free - atmospheric pollutants - field sampler

INVESTIGATOR AND AFFILIATION: O. W. Berg, OTC Section

LIAISON OFFICER OR SUPERVISOR: Dr. O. Meresz

RESEARCH CATEGORY: *INTERNAL* X *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE: To develop an atmospheric sampler which does not depend on impingers and adsorbents for the concentration of atmospheric pollutants.

DESCRIPTION: Atmospheric pollutants are usually present at high dilution and, for analytical purposes, it is normally necessary to concentrate them to a high degree. There is a great danger that during the conventional techniques artefacts are introduced.

According to the concepts developed by Dr. Meresz, it is proposed that the atmospheric samples are cooled below their dew points. In this case the condensing water vapours will entrap the pollutants, and the condensates can be analysed by conventional means.

DURATION OF PROJECT: 0.3 *YEARS* *PRESENT YEAR IS* 1 *YEAR* *REPORTING DATE:* April 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	2,000		0.2	

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes, internal followed by publication.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: The exploratory experiments have started.

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 1

BRANCH: Pesticides Advisory Committee *DATE:* July 1982

PROJECT TITLE:

Smut of fall panicum

KEY WORDS: Biological control. Smut. Fall panicum

PRINCIPAL INVESTIGATOR AND AFFILIATION Dr. J. F. Alex
Dept. of Environmental Biology - University of Guelph

LIAISON OFFICER OR SUPERVISOR Pesticides Advisory Committee

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE: a) To ascertain if the smut which occurs naturally on fall panicum in several localities in Ontario represents a single taxon or if two or more races are involved.
b) To describe the morphology of the organism(s) and the symptoms of infection on fall panicum.
c) To determine how to mass culture the organism(s) on fall panicum.
d) To Determine if the smut organism(s) is capable of infecting and damaging any commercial grain crops, or related wild grasses.

DESCRIPTION:

Fall panicum, Panicum dichotomiflorum var. geniculatum is one of the most important annual grass weeds in corn in southern Ontario. It is tolerant of many of the herbicides in regular use and has been increasing in abundance as well as spreading to new districts. In a few localities in Ontario, fall panicum has been attacked by a purple smut.

The smut is worthy of examination as a potential biocontrol agent for fall panicum and the first step towards achieving that goal would be identification of the agent and learning to culture it.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress Report ~~Dec. 1982~~

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$19,000	$13,500		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 2

BRANCH: Pesticides Advisory Committee *DATE:* July 1982

PROJECT TITLE: The separate metering of herbicides and water to a controlled droplet applicator

KEY WORDS: Metering. Herbicides and water. Controlled droplet applicator

PRINCIPAL INVESTIGATOR AND AFFILIATION: Prof. G. W. Anderson
Crop Science Dept., University of Guelph

LIAISON OFFICER OR SUPERVISOR: Pesticides Advisory Committee

RESEARCH CATEGORY: *INTERNAL* — *GRANT* X *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:

a) To assess the uniformity of dispersal of herbicides from a controlled droplet applicator when the herbicide and water are metered separately.

b) To assess the weed control obtained with herbicides and water separately metered onto a controlled droplet applicator.

DESCRIPTION:

There are three ways in which controlled droplet applicators can reduce the amount of herbicide introduced into the environment. First, there can be a reduction of drift onto non target areas. This is particularly true if the operator takes advantage of the possibility of using low carrier volume and is therefore able to spray rapidly and complete the operation during a calm period of the day. Second, with some chemicals, ie. glyphosate, there can be a reduction in the amount of herbicide required when applied in low carrier volume distributed in specific droplet sizes. Third, the machine presents the possibility of applying the herbicide without pre-mixing. The herbicide and water can be separately metered onto the spinning cone. Separate tanks for formulated herbicide and water could reduce the possibility of contaminating water supplied when filling the sprayer and produces no premixed herbicide and water to dispose of at the end of spraying.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$5,700	$5,700		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

PAC - 3

BRANCH: Pesticides Advisory Committee

DATE: July 1982

PROJECT TITLE: Integrated management of snow mold diseases of turfgrasses

KEY WORDS: Integrated management. Turf diseases

PRINCIPAL INVESTIGATOR AND AFFILIATION: Dr. L. L. Burpee
Dept. of Environmental Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR: Pesticides Advisory Committee

RESEARCH CATEGORY:
INTERNAL ___ GRANT X
UNSOLICITED CONTRACT ___ SOLICITED CONTRACT ___
MULTI-YEAR PROJECT ___ CONCURRENT PROJECT ___

OBJECTIVE:

a) To determine if specific turf management practices provide sufficient control of snow mold diseases to justify the application of less than label rates of fungicide.

b) To determine if the efficacy of snow mold fungicides, applied at less than label rates, can be significantly improved by additions of various "sticker" materials to tank mixers.

DESCRIPTION:

Pink and grey snow molds are among the principal diseases affecting turfgrasses in Ontario. Since the early 1930s, turf managers have controlled these diseases by applying fungicides in late autumn, prior to the first snow fall.

A reduction in fungicide application rates for snow mold control may be achieved through an integrated management scheme. Such a scheme would incorporate cultural as well as chemical methods in an attempt to obtain effective control with less fungicide.

DURATION OF PROJECT: 1 YEARS
PRESENT YEAR IS: 1st YEAR
REPORTING DATE: Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$8,000	$8,000		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ___
JOINTLY FUNDED PROJECT ___
OTHER ___

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 4

BRANCH: Pesticides Advisory Committee *DATE:* July 1982

PROJECT TITLE: Monitoring dormant seeds in the soil to predict weed infestations and herbicide needs the following year.

KEY WORDS: Monitoring. Seed bank. Herbicide needs

PRINCIPAL INVESTIGATOR AND AFFILIATION Dr. P. B. Cavers
Dept. of Plant Science, University of Western Ontario

LIAISON OFFICER OR SUPERVISOR Pesticides Advisory Committee

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
To develop a sampling technique which will minimize the sampling effort and maximize valid results in order to estimate the seed bank of a troublesome weed species, (Chenopodium album L. - Lamb's-quarters) including both triazine-susceptible and triazine-resistant populations.

DESCRIPTION:

A seed bank under cropping conditions is described as the number of viable seeds in the first 15 cm of soil. The desired sampling technique is defined as the optimal size and minimum number of soil cores needed as well as the sampling pattern to follow in order to get a representative sample.

Estimation of the seed bank can be used as a tool to determine potential levels of infestation of troublesome weeds. The maximum acceptable range in the seed bank of a problem weed can be estimated for particular crops. This range is the upper limit below which herbicide spraying would not be necessary.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$8,800	$8,800		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 5

BRANCH: Pesticides Advisory Committee *DATE:* July 1982

PROJECT TITLE:
Behaviour of aldicarb (Temik(R)) in soil

KEY WORDS:
Insecticide. Aldicarb. Persistence. Soil

PRINCIPAL INVESTIGATOR AND AFFILIATION
Dr. R. A. Chapman
University of Western Ontario, London, Ontario

LIAISON OFFICER OR SUPERVISOR
Pesticides Advisory Committee

RESEARCH CATEGORY:
INTERNAL —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
a) Determine the persistence of seed furrow applications of aldicarb in mineral and organic soils.
b) Determine the mobility of aldicarb and its oxidation products in soil.
c) Determine the persistence of aldicarb residues in potato plants.

DESCRIPTION:

Information obtained on the persistence of aldicarb and its oxidation products would suggest that because of their limited persistence in soil, these materials should not constitute a serious environmental hazard. Yet contamination of water supplies on Long Island in the United States where aldicarb is used extensively for potato insect control has been reported. Another puzzling aspect of the problem is that although the residues disappear rapidly from soil, the registrant and growers claim that a single soil application of aldicarb gives insect control for all or nearly all of the growing season. This claim would appear to be justified since aldicarb residues, some of which are quite high, are occasionally being detected in newly harvested potatoes. During 1982, it is proposed to initiate some further studies in an attempt to obtain some answers to these questions.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 3rd *YEAR* *REPORTING DATE* Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$37,200	$13,300		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY **PAC - 6**

BRANCH: **Pesticides Advisory Committee** *DATE:* **July 1982**

PROJECT TITLE: **Dislodgeable pesticide residues on turfgreen foliage in relation to safe re-entry.**

KEY WORDS: **Pesticide residues** **Turfgrass** **Re-entry**

PRINCIPAL INVESTIGATOR AND AFFILIATION **Dr. M. K. Sears**
Dept. of Environmental Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR **Pesticides Advisory Committee**

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

a) To determine the persistence of commonly used pesticides on turfgrass foliage, particularly residues that can be dislodged.

b) To examine the influence of cultural and climatic factors (rainfall, mowing etc.) on the persistence of pesticides on turfgrass foliage and on the tendency of these residues to dislodge upon human contact.

DESCRIPTION:

During recent years there has been considerable controversy and debate over the use of pesticides in public areas. This has been particularly true for the use of 2,4-D and related herbicides for weed control in school yards, parks, playing fields, as well as on roadsides and powerlines.

Many people wish to be informed if there is any chance that they or their children could be exposed to significant levels of a recently applied pesticide in a public area. Little information is available on the persistence of dislodgeable residues of herbicides or of moderately toxic insecticides used on recreational areas.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$34,500	Nil		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? **Yes**

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: **This study was actually funded late in the 1981-82 fiscal year. Laboratory work commenced in early 1982, but field studies did not commence until the 1982 growing season.**

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 7

BRANCH: Pesticides Advisory Committee *DATE:* July 1982

PROJECT TITLE: Weed monitoring techniques for the detection of specific periods of crop interference to reduce or eliminate herbicide usage

KEY WORDS: Weed monitoring. Crop interference. Herbicide reduction

PRINCIPAL INVESTIGATOR AND AFFILIATION: Dr. J. Dekker
Department of Environmental Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR: Pesticides Advisory Committee

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE: 1) Monitor for exact periods of quackgrass-induced stress on soybeans by means of: A) infrared thermometric accumulation of "stress-degree-day"; B) plant nutrient (N,P,K) tissue testing of both crop and weed; and C) the serial removal of quackgrass through the growing season; and, 2) use this information, as it occurs, to time the application of sub-lethal doses of selective chemicals, or physical (cultivation) control measures, to slow the quackgrass growth during this stress period; 3) to evaluate soybean yield data to determine if these monitoring techniques and alternative control measures have a potential for reducing or eliminating herbicide usage on quackgrass in soybeans.

DESCRIPTION:

Infrared Thermometry: In the first trial, air-leaf temperature differentials will be taken daily at solar noon (period of peak stress) throughout the season. Stress-degree-day information will be accumulated. When appreciable stress is recognized, sub-lethal (0.1 and 0.25 kg/ha) doses of BAS 9052, TF 1169, NCI 96683 and DOWCO 453 will be applied. Physical methods (cultivation) of weed control will also be used at the onset of stress. Quackgrass suppression will continue by these methods until the stress period is over.

Comparisons will be made of soybean grain yields in treated, untreated (weedy control), and weed-free plants. The effectiveness of these measures will then be assessed.

Tissue Testing: In a second trial, weekly plant tissue tests will be conducted on quackgrass infested soybean plots established in the same manner as the first trial. As with the first trial, periods of nutrient stress will be determined and treated with sub-lethal doses of the selective herbicides, and cultivated. Soybean yield comparison will, likewise, be made.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$14,000	$9,000		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 8

BRANCH: Pesticides Advisory Committee *DATE:* July 1982

PROJECT TITLE: **Determination of the cause of poor efficacy of insecticides used for control of rootworms.**

KEY WORDS: **Insecticides** **Efficacy** **Rootworms**

PRINCIPAL INVESTIGATOR AND AFFILIATION **Dr. C. R. Ellis**
Department of Environmental Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR **Pesticides Advisory Committee**

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

1. To obtain a second year of data on evaluating various methods of application to determine how much they contribute to poor control on farms.
2. Survey farms to determine application rates used by farmers .
3. To screen rootworm larvae for resistance on a few specific farms where a problem is indicated.

DESCRIPTION: The most important pests of field corn in Ontario, in terms of the insecticide used for control, are rootworms. A 1973 survey of pesticide use in Ontario showed that granular insecticides for rootworms were applied to over 76,000 ha. This usage has not declined. In fact, the amount of pesticide used now is probably greater because we now have two species of rootworm whereas in 1973 only the northern corn rootworm was a problem. The western corn rootworm has now spread through western Ontario and it is the predominant species in southwestern counties. As indicated by the economic thresholds for rootworm adults in the United States (1 adult western or 2 northern per plant), the western species is at least as damaging as the northern.

The problem has been an increasing number of complaints of poor control. In some cases the registered and recommended controls in Ontario have resulted in less than 50% kill. We cannot advise farmers until we determine whether the problem is poor application, poor persistence of some of the hypothesized. Work has begun in 1981.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$22,800	$15,000		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? **Yes**

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY **PAC - 9**

BRANCH: **Pesticides Advisory Committee** *DATE:* **July 1982**

PROJECT TITLE: **Evaluating Beauveria bassiana for biological control of seed and cone insects in white spruce.**

KEY WORDS: **Biological Control** **Insects** **White Spruce**

PRINCIPAL INVESTIGATOR AND AFFILIATION: **Dr. W. H. Fogal**
Canadian Forestry Service

LIAISON OFFICER OR SUPERVISOR: **Pesticides Advisory Committee**

RESEARCH CATEGORY:
INTERNAL GRANT X
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT ——
CONCURRENT PROJECT ——

OBJECTIVE:

To evaluate Beauveria bassiana, an entomopathogenic fungus, as a biological control agent for the spruce cone maggot and the spruce seedmoth by dusting flowers and inoculating soil with spores.

DESCRIPTION:

Black and white spruce are major commercial tree species used in reforestation programs in central and eastern Canada. The demand for seed is heavy. Seed requirements cannot be met in some years because of insect attack and periodic nature of cone crop production. When crops are poor the entire seed crop can be destroyed by insects and even in good crop years, large percentages of seed are destroyed.

Experimental trials to control seed and cone insects of spruce with chemical insecticides have not always been successful. The variable results and hazards associated with chemical treatments prompts consideration of biological control options.

DURATION OF PROJECT: 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE:* Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$8,000	$8,000		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? **Yes**

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY **PAC - 10**

BRANCH: **Pesticides Advisory Committee** *DATE:* **July 1982**

PROJECT TITLE: **Feasibility of using the egg parasite, Trichogramma minutum Riley, for Biological Control of the Spruce Budworm, Choristoneura fumiferana (Clemens)**

KEY WORDS: **Biological Control Spruce Budworm Egg Parasite**

PRINCIPAL INVESTIGATOR AND AFFILIATION: **Dr. M. Hubbes**
Faculty of Forestry, University of Toronto

LIAISON OFFICER OR SUPERVISOR: **Pesticides Advisory Committee**

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

1. To evaluate the feasibility of using aerial inundative releases of T. minutum for the control of the spruce budworm.
2. To investigate the effects of different environmental and release conditions on levels of parasitism by T. minutum.
3. To characterize strains of T. minutum and determine the one best suited for inundative release.
4. To establish guidelines of quality control for the mass production of T. minutum

DESCRIPTION:

In Ontario's mixed-wood forests, the spruce budworm is the most destructive insect pest. As of July 1980, 18.9 million hectares of forest within the province were infested with damaging populations and tree mortality was evident in 45% of these stands.

Currently, the spruce budworm is controlled by selective aerial applications of insecticides. The continued reliance on insecticides as the principal management techniques, however, is unacceptable as a long-term solution. Considerable information is now available on the environmental problems encountered with this approach. With advancements in technology over the past decade, biological control of the budworm through mass production in the laboratory and field inundation of parasites offers a promising alternative to chemical insecticides.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$14,260.	$14,260.		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? **Yes**

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY **PAC - 11**

BRANCH: **Pesticides Advisory Committee** *DATE:* **July 1982**

PROJECT TITLE: **Evaluation of sublethal effects of pesticides under natural and laboratory conditions.**

KEY WORDS: **Pesticides** **Zooplankton** **Sub-lethal Effects**

PRINCIPAL INVESTIGATOR AND AFFILIATION **Dr. N. K. Kaushik**
Dept. of Environmental Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR **Pesticides Advisory Committee**

RESEARCH CATEGORY: *INTERNAL* ___ *GRANT* X *UNSOLICITED CONTRACT* ___ *SOLICITED CONTRACT* ___ *MULTI-YEAR PROJECT* ___ *CONCURRENT PROJECT* ___

OBJECTIVE:

To determine sublethal effects, if any, of atrazine and methoxychlor on zooplankton.

DESCRIPTION:

Compare size, biomass and fecundity of selected species of Cladocera, Copepoda and Rotifera from control corrals and from corrals treated with sublethal concentrations of atrazine and methoxychlor.

Assess the impact of sublethal concentrations of atrazine and methoxychlor on growth and reproduction.

One of the goals of the program will be to construct life tables for important species of zooplankton collected from variously treated and control limnocorrals.

DURATION OF PROJECT **2** *YEARS* *PRESENT YEAR IS* **2nd** *YEAR* *REPORTING DATE* **Progress Report Dec. 1982**

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$19,360.	**$10,220.**		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* ___ *JOINTLY FUNDED PROJECT* ___ *OTHER* ___

IS A REPORT ANTICIPATED? **Yes**

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 12

BRANCH: Pesticides Advisory Committee *DATE:* July 1982

PROJECT TITLE: The assessment of the hazards of formulations of Sevin (carbaryl) to Honeybees, other pollinators, and floral resources in Ontario.

KEY WORDS: Carbaryl Honeybees Other Pollinators

PRINCIPAL INVESTIGATOR AND AFFILIATION Dr. P.G. Kevan
Dept. of Environmental Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR Pesticides Advisory Committee

RESEARCH CATEGORY: *INTERNAL* — *GRANT* X *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:

1. Determine if Sevin XLR is less hazardous to honeybees, and other pollinators, than Sevin 80S in field situations in Ontario.
2. How Sevin XLR and Sevin 80S enter honeybees hives to cause mortality in the hive.
3. The effects of Sevin XLR and Sevin 80S on non-target arthropods in areas of application of the insecticides, paying special attention to pollinating insects and other insects of possible beneficial importance (e.g. predators and parasitoids).
4. Recommendations as to the use of Sevin XLR on crops in Ontario

DESCRIPTION:

Study areas will be established in agricultural areas of Ontario in the vicinity of Guelph. These will represent various cropping and land use systems. On each, hives of honeybees will be established. The hives will be matched by starting all equally in terms of weight of bees, amount of brood, and amount of stored honey, feeding, Pollen and nectar will be examined for Sevin residues and sweep samples and observations of other insects made.

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$13,500	$13,500		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

PAC - 13

BRANCH: Pesticides Advisory Committee

DATE: July 1982

PROJECT TITLE: Development of a technique for monitoring the variegated cutworm in tomatoes in Essex and Kent counties to reduce pesticide damage.

KEY WORDS: Variegated cutworm; Tomatoes; Pesticide damage

PRINCIPAL INVESTIGATOR AND AFFILIATION: Mr. H. J. Leili, Agricultural Research Department, H. J. Heinz Co. of Canada

LIAISON OFFICER OR SUPERVISOR: Pesticides Advisory Committee

RESEARCH CATEGORY: INTERNAL ___ GRANT X; UNSOLICITED CONTRACT ___ SOLICITED CONTRACT ___; MULTI-YEAR PROJECT ___ CONCURRENT PROJECT ___

OBJECTIVE:

To reduce pesticide damage in tomatoes through monitoring variegated cutworm populations.

DESCRIPTION:

The variegated cutworm, Peridroma saucia Hbn. has been and continues to be an economic threat to tomato crops grown throughout southwestern Ontario from mid-July to mid-September. The location of these infested fields is very difficult to predict as they change from year to year. Monitoring cutworm moths with a black light trap has been only moderately effective. A small number of traps in a very large growing area does not adequately reflect the development of cutworm problems in any one specific area.

At the present time, when high moth counts occur in the light traps, growers are informed. Some growers then apply methomyl as a preventive measure even though high moth populations do not necessarily mean that high larval populations will occur. Others wait until damage begins and then are required to make several applications of methomyl at the highest recommended rates with very uncertain results and often severe damage because, while methomyl is extremely effective against larvae in the early stages of development, it has reduced effectiveness against large larvae.

DURATION OF PROJECT: 1 YEARS; PRESENT YEAR IS 1st YEAR; REPORTING DATE: Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$3,500	$3,500		

SOURCE OF FUNDS: REGULAR WORK PROGRAM X; SPECIAL MINISTRY FUNDING ___; JOINTLY FUNDED PROJECT ___; OTHER ___

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY **PAC - 14**

BRANCH: **Pesticides Advisory Committee** *DATE:* **July 1982**

PROJECT TITLE:
Biology and Control of Thrips on Cabbage

KEY WORDS: **Biology** **Control** **Thrips** **Cabbage**

PRINCIPAL INVESTIGATOR AND AFFILIATION: **Dr. F. L. McEwen**
Dept. of Environmental Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR: **Pesticides Advisory Committee**

RESEARCH CATEGORY:
INTERNAL ___ *GRANT* X *UNSOLICITED CONTRACT* ___ *SOLICITED CONTRACT* ___ *MULTI-YEAR PROJECT* ___ *CONCURRENT PROJECT* ___

OBJECTIVE:
To learn enough about thrips on cabbage so that effective and economic control methods can be recommended.

DESCRIPTION:
Field trials in 1982 will concentrate in the following areas:

1. **Identification of overwintering sites.**
2. **Development of the thrips population in these overwintering sites and movement to cabbage.**
3. **Early planting of cabbage to determine whether or not these are infested by the 1st generation thrips.**
4. **Timing of spray applications to determine interval between sprays.**
5. **Prediction of movement to cabbage based on population build-up and dispersal.**

DURATION OF PROJECT 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* **Progress Report Dec. 1982**

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$4,680	$4,680		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X *SPECIAL MINISTRY FUNDING* ___ *JOINTLY FUNDED PROJECT* ___ *OTHER* ___

IS A REPORT ANTICIPATED? **Yes**

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY **PAC - 15**

BRANCH: **Pesticides Advisory Committee** *DATE:* **July 1982**

PROJECT TITLE: **Losses in production of potatoes, rutabagas, and onions attributible to insects, diseases and weeds.**

KEY WORDS: **Food losses** **Pests** **Vegetable Crops**

PRINCIPAL INVESTIGATOR AND AFFILIATION **Dr. D. G. R. McLeod**
Dept. of Zoology, University of Western Ontario

LIAISON OFFICER OR SUPERVISOR **Pesticides Advisory Committee**

RESEARCH CATEGORY:
INTERNAL —— *GRANT* X
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To determine losses caused by pests (insects, diseases and weeds) to three crops - potatoes, rutabagas and onions - of economic importance to Ontario.

DESCRIPTION:

Second year of data to be obtained

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$20,800	$12,000		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? **Yes**

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY **PAC - 16**

BRANCH: **Pesticides Advisory Committee** *DATE:* **July 1982**

PROJECT TITLE: **Development of an acceptable procedure to allow disposal of pesticide containers.**

KEY WORDS: **Pesticide containers** **Disposal** **Landfill sites**

PRINCIPAL INVESTIGATOR AND AFFILIATION **Mr. J. R. W. Miles**
University of Western Ontario

LIAISON OFFICER OR SUPERVISOR **Pesticides Advisory Committee**

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

Results obtained in 1981 demonstrated that, in general, pesticide containers, when properly rinsed, will constitute no serious environmental hazard when disposed of in sanitary landfill sites. It is our opinion that properly rinsed containers should be disposed of in a normal fashion in regular municipal garbage collections. To bring the project to a conclusion in 1982, we have four objectives:

DESCRIPTION:

1. Results of the container disposal study will be presented to as many grower's group as possible. The importance of rinsing and the ease with which it can be accomplished with the rinsing devices will be emphasized.
2. Rinser efficiency versus pesticide formulation: While the rinsers worked adequately with most formulated pesticides in our 1981 studies, some formulations proved difficult to remove. We propose to conduct, with grower cooperation, a more extensive survey of rinser efficiency relative to different pesticide formulations.
3. Monitoring pesticide residues in ground water at the Watford landfill site will continue.
4. Preparation of final report.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$31,080	$6,200		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* X *OTHER* ——

IS A REPORT ANTICIPATED? **Yes**

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 17

BRANCH: Pesticides Advisory Committee *DATE:* July 1982

PROJECT TITLE: Development of sex attractant traps for monitoring changes in low density spruce budworm populations as a means of implementing early intervention management strategies.

KEY WORDS: Spruce Budworm Population Sex Attractant traps

PRINCIPAL INVESTIGATOR AND AFFILIATION Dr. C. J. Sanders
Dept. of Biology, The Sault College of Applied Arts & Technology

LIAISON OFFICER OR SUPERVISOR Pesticides Advisory Committee

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

The 1982 objectives remain the same as for 1981.

DESCRIPTION:

i) To evaluate the potential of new trap designs for monitoring fluctuations of spruce budworm populations at low density.

ii) To correlate trap catches with population density.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 3rd *YEAR* *REPORTING DATE* Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$35,750	$11,550		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY **PAC - 18**

BRANCH: **Pesticides Advisory Committee** *DATE:* **July 1982**

PROJECT TITLE: **Meadow mouse control in orchards**

KEY WORDS: **Meadow mice** **Control** **Orchards**

PRINCIPAL INVESTIGATOR AND AFFILIATION **Dr. Z. Ziddiqi**
Chemical Research International, Toronto

LIAISON OFFICER OR SUPERVISOR **Pesticides Advisory Committee**

RESEARCH CATEGORY: *INTERNAL* ___ *GRANT* X *UNSOLICITED CONTRACT* ___ *SOLICITED CONTRACT* ___ *MULTI-YEAR PROJECT* ___ *CONCURRENT PROJECT* ___

OBJECTIVE:

To demonstrate the effectiveness of the specially designed Raduanyi type bait station for long term control of meadow mice.

To evaluate the effectiveness of new anticoagulant rodenticides in controlling meadow mice.

DESCRIPTION:

As above.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$30,000	$17,500		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* ___ *JOINTLY FUNDED PROJECT* ___ *OTHER* ___

IS A REPORT ANTICIPATED? **Yes**

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY **PAC - 19**

BRANCH: **Pesticides Advisory Committee** *DATE:* **July 1982**

PROJECT TITLE: **Study of the herbicidal properties and environmental fate of trichlopyr.**

KEY WORDS: **Herbicides environmental fate trichlopyr**

PRINCIPAL INVESTIGATOR AND AFFILIATION: **Dr. D. W. Smith**
Dept. of Botany and Genetics, University of Guelph

LIAISON OFFICER OR SUPERVISOR: **Pesticides Advisory Committee**

RESEARCH CATEGORY:
INTERNAL —— *UNSOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* ——
GRANT ~~X~~ *SOLICITED CONTRACT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

i. Determine the relative mobility and persistence of trichlopyr in soil, in comparison with these properties of 2,4,5-T and picloram,
ii. the relative activity of trichlopyr under controlled conditions on a spectrum of target and non-target plants common in Ontario in comparison with 2,4,5-T and picloram,
iii. the efficacy of trichlopyr, in comparison with 2,4,5-T and picloram for selective vegetation management on southern Ontario rights-of-way.

DESCRIPTION:

Use of herbicides to control woody vegetation on utility right-of-ways, for example, by the Ontario Hydroelectric Power Commission, has been a widespread management procedure. Recently, some of the more effective chemicals for vegetation control have been removed or restricted in use by governmental control agencies because of their potential environmental or health hazard, e.g. 2,4,5-T or by the user agencies because of their mobility and persistence, e.g. picloram.

A new compound, trichlopyr (Garlon) produced by Dow Chemical Ltd., may be an attractive alternative. Existing information suggests that it may be as effective on target species, (mainly trees), as were those herbicides used previously (2,4,5-T and picloram).

DURATION OF PROJECT **possibly 2** *YEARS* *PRESENT YEAR IS* **1st** *YEAR* *REPORTING DATE* ~~Progress Report~~ **Dec. 1982**

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	?	**$13,000**		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM **X** *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? **Yes**

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ontario of the Environment

RESEARCH AND DEVELOPMENT INVENTORY

PAC - 20

BRANCH: Pesticides Advisory Committee

DATE: July 1982

PROJECT TITLE: The biology and control of mosquitoes and other biting flies in Ontario.

KEY WORDS: Biology and Control Mosquitoes Biting Flies

PRINCIPAL INVESTIGATOR AND AFFILIATION: Dr. G. A. Surgeoner, Dr. B. V. Helson — Dept. of Environmental Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR: Pesticides Advisory Committee

RESEARCH CATEGORY: INTERNAL —— GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:

DESCRIPTION:

Proposal withdrawn due to departure from Guelph of Dr. Helson (See PAC 23-1981)

See PAC - 27, July 1982

DURATION OF PROJECT ——— YEARS PRESENT YEAR IS ——— YEAR REPORTING DATE ———

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR

SOURCE OF FUNDS: REGULAR WORK PROGRAM —— SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? 1981 report will be reviewed in the PAC annual research assessment report.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

PAC - 21

BRANCH: Pesticides Advisory Committee

DATE: July 1982

PROJECT TITLE: Weather-timed fungicide schemes for vegetable crops.

KEY WORDS: Weather Timing Fungicides Vegetable Crops

PRINCIPAL INVESTIGATOR AND AFFILIATION: Dr. T. J. Gillespie - Land Resources Science U of Guelph
Dr. J. C. Sutton - Dept. Environmental Biology

LIAISON OFFICER OR SUPERVISOR: Pesticides Advisory Committee

RESEARCH CATEGORY: INTERNAL ___ GRANT X UNSOLICITED CONTRACT ___ SOLICITED CONTRACT ___ MULTI-YEAR PROJECT ___ CONCURRENT PROJECT ___

OBJECTIVE:
To test the microcomputerized weather-monitoring devices for timing fungicides to control Botrytis leaf blight in onions.

DESCRIPTION:
1. To test BOTCAST, a model for predicting the 1% level of Botrytis leaf blight of onions.
2. To complete and test DOWNCAST, a model for predicting downy mildew of onions.
3. To evaluate DATAPOD, a miniature microprocessor-based device for monitoring temperature and wetness duration or humidity in growers' fields.
4. To determine relationships of weather factors and sporulation by Botrytis squamosa on onions.

DURATION OF PROJECT: 3 YEARS PRESENT YEAR IS 3rd YEAR REPORTING DATE Progress Report Dec. 1982

BUDGET: TOTAL DOLLARS — TOTAL PROJECT $33,000; CURRENT YEAR $16,000 — MAN YEARS — TOTAL PROJECT; CURRENT YEAR

SOURCE OF FUNDS: REGULAR WORK PROGRAM X SPECIAL MINISTRY FUNDING ___ JOINTLY FUNDED PROJECT ___ OTHER ___

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY **PAC - 22**

BRANCH: **Pesticides Advisory Committee** *DATE:* **July 1982**

PROJECT TITLE: **Feasibility of using parasites and/or predators in a program of integrated control of the onion maggot**

KEY WORDS: **Integrated Pest Management** **Parasites** **Onion maggot**

PRINCIPAL INVESTIGATOR AND AFFILIATION **Dr. A. D. Tomlin, Dr. J. H. Tolman - University of Western Ontario**

LIAISON OFFICER OR SUPERVISOR **Pesticides Advisory Committee**

RESEARCH CATEGORY: *INTERNAL GRANT* X — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:

See below

DESCRIPTION:

Objectives and plan for the program

a. To continue to improve the mass rearing technique for A. pallipes, and to conduct further laboratory and field studies on its biology and on the factors influencing its effectiveness under field conditions.

b. To develop a mass rearing procedure for A. billineata and to conduct laboratory and field studies on its biology and on the factors influencing its effectiveness under field conditions.

c. To continue laboratory studies on the toxicity of pesticides used in onion pest control programs to both parasites.

d. To conduct field trials at the Thedford Marsh designed to assess the potential of A. bilineata in suppressing onion maggot during the growing season and of A. pallipes in parasitizing the overwintering onion maggot population.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 3rd *YEAR* *REPORTING DATE* Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$39,750	$13,450		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? **Yes**

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

See PAC - 15/1981

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 23

BRANCH: Pesticides Advisory Committee *DATE:* July 1981

PROJECT TITLE: Influence of environmental factors on the rate of microbial degradation of pesticides in soil.

KEY WORDS: Pesticides Microbial degradation Soil Water

PRINCIPAL INVESTIGATOR AND AFFILIATION Dr. C. M. Tu
University of Western Ontario

LIAISON OFFICER OR SUPERVISOR Pesticides Advisory Committee

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To investigate the effect of soil moisture on the rate of microbial degradation of chlorpyrifos and chlorfenvinphos.

DESCRIPTION:

The technique used will be similar to that used successfully in an earlier temperature study, with tests being conducted using two soil types and three moisture levels (Air-dry, and 30 and 60% moisture holding capacity) under sterile and non-sterile conditions. As in the previous study, the soils will be incubated for 24 weeks, with samples taken periodically for assessment of microbial populations and determination of insecticide residues.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$16,400	$8,900		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 24

BRANCH: Pesticides Advisory Committee *DATE:* July 1982

PROJECT TITLE: Integrated Pest Management in Ontario

KEY WORDS: IPM Ontario

PRINCIPAL INVESTIGATOR AND AFFILIATION Ontario Apple Marketing Commission

LIAISON OFFICER OR SUPERVISOR Pesticides Advisory Committee

RESEARCH CATEGORY: *INTERNAL GRANT* X — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:

To determine the orchard to orchard variability of various insect pests and discover what factors contribute to this variability.

DESCRIPTION:

Apple pest management to date has been able to accurately determine the optimum spray timing for the major pests, such as codling moth and apple maggot, on a regional basis. In an effort to expand this program to cover the pests of a more sporadic nature, individual orchard assessment and pest control recommendations were attempted in 1979. It was found that certain pests, formerly considered to be of minor status, varied greatly from orchard to orchard in both population and resultant damage level. It became obvious that there was a need to determine what factors account for this variability and to devise an orchard monitoring system to predict their presence with an eye to preventative control measures.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 3rd *YEAR* *REPORTING DATE* Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$22,500	$7,500		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: Additional funds provided by OMAF and the Ontario Apple Marketing Commission.

REMARKS:

MOE 1293 6/78

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 25

BRANCH: Pesticides Advisory Committee *DATE:* July 1982

PROJECT TITLE: Efficacy of alternative herbicides to improve onion establishment on muck soils, as a substitute for the loss of allidichlor

KEY WORDS: Onions Muck soils Herbicides

PRINCIPAL INVESTIGATOR AND AFFILIATION Dr. V. S. Machado
Dept. of Horticultural Science, University of Guelph

LIAISON OFFICER OR SUPERVISOR Pesticides Advisory Committee

RESEARCH CATEGORY:
INTERNAL ___ *UNSOLICITED CONTRACT* ___ *MULTI-YEAR PROJECT* ___
GRANT X *SOLICITED CONTRACT* ___ *CONCURRENT PROJECT* ___

OBJECTIVE:

To find suitable alternative herbicides for allid chlor, a herbicide implicated in the IBT affair and against which regulatory action has been taken.

DESCRIPTION:

i. Field trials at Bradford Marsh testing combinations of grass weed herbicides (dichlofop-methyl, BAS 9052 and TF 1169) with broadleaf weed herbicides (ioxynil, bentazon, oxyfluorfen, chlorpropham and cyanazine).

ii. Low dosage of ioxynil, cyanazine and other herbicides, applied at closer intervals and more frequently.

iii. Some field investigations with 'conditioned' seeds and their interaction with postemergence herbicides.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	> $6,000	$6,000		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X *SPECIAL MINISTRY FUNDING* ___ *JOINTLY FUNDED PROJECT* ___ *OTHER* ___

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

PAC - 26

BRANCH: Pesticides Advisory Committee

DATE: July 1982

PROJECT TITLE: Factors affecting the efficacy of sprays to control white mold on white bean.

KEY WORDS: White mold White beans Efficacy

PRINCIPAL INVESTIGATOR AND AFFILIATION: Dr. R. Hall
Dept. of Environmental Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR: Pesticides Advisory Committee

RESEARCH CATEGORY: INTERNAL ___ GRANT X UNSOLICITED CONTRACT ___ SOLICITED CONTRACT ___ MULTI-YEAR PROJECT ___ CONCURRENT PROJECT ___

OBJECTIVE:

To examine factors which affect the efficacy of chemical control of white mold of white beans.

DESCRIPTION:

White mold of white beans, caused by the fungus Sclerotinia sclerotiorum, can cause losses in individual fields up to 100% and is estimated to cause annual losses in Ontario of 5 to 10%. The major approach to controlling the disease is to apply a recommended fungicide, i.e. Benlate, Botran, Easout or Bravo, from ground rigs or from the air. In 1981 about 10,000 acres were sprayed, mostly (65%) with Benlate. Trials conducted in 1981 showed that Benlate can be very effective in controlling the disease in small plots under experimental conditions but may be less effective when applied by commercial applicators or growers.

DURATION OF PROJECT: 2 YEARS PRESENT YEAR IS 2nd YEAR REPORTING DATE ~~Progress Report~~ Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$11,935.00	$6,635.00		

SOURCE OF FUNDS: REGULAR WORK PROGRAM X SPECIAL MINISTRY FUNDING ___ JOINTLY FUNDED PROJECT ___ OTHER ___

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY PAC - 27

BRANCH: Pesticides Advisory Committee DATE: July 1982

PROJECT TITLE: Evaluation of adult and larval mosquito sampling techniques in Ontario

KEY WORDS: Mosquitoes Sampling techniques Evaluation

PRINCIPAL INVESTIGATOR AND AFFILIATION: Dr. G. A. Surgeoner
Dept. of Environmental Biology, University of Guelph

LIAISON OFFICER OR SUPERVISOR: Pesticides Advisory Committee

RESEARCH CATAGORY: INTERNAL ___ GRANT X UNSOLICITED CONTRACT ___ SOLICITED CONTRACT ___ MULTI-YEAR PROJECT ___ CONCURRENT PROJECT ___

OBJECTIVE:

Completion of a long term study on the biology and control of mosquitoes and biting flies in Ontario.

DESCRIPTION:

See PAC - 23, July 1981. Inventory of Research Projects 1981-82.

DURATION OF PROJECT: 7 YEARS PRESENT YEAR IS 7th and final YEAR REPORTING DATE: Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$310,000	$10,000		

SOURCE OF FUNDS: REGULAR WORK PROGRAM X SPECIAL MINISTRY FUNDING ___ JOINTLY FUNDED PROJECT ___ OTHER ___

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment

RESEARCH AND DEVELOPMENT INVENTORY

PAC - 28

BRANCH: Pesticides Advisory Committee

DATE: July 1982

PROJECT TITLE: The residues of metalaxyl in tobacco plants, soils and in the watershed.

KEY WORDS: Metalaxyl, Residues, Soil, Water

PRINCIPAL INVESTIGATOR: Dr. L. V. Edgington

AFFILIATION: Dept. of Environmental Biology, University of Guelph

LIAISON OFFICER / SUPERVISOR: Pesticides Advisory Committee

RESEARCH / SURVEY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE:

To monitor metalaxyl and its metabolites in soil and watersheds (sediment and water) in the tobacco growing region. Current studies, indicate a major metabolite, the acid formed by demethoxytation, is quite persistent in soil.

DESCRIPTION:

In 1981 research proved that metalaxyl was leached through soils in greater amount and depth than atrazine. This was especially true in sandy loam soils. Previously atrazine had been shown to be present in runoff from treated fields. The possibility exists that metalaxyl might also move into watersheds if it, was used extensively in soil.

This would depend on the persistence of metalaxyl. Our 1981 studies showed a half life in soils of about one month or longer. Also it is very persistent in natural lake water and at pH's of 3 to 8.

DURATION OF PROJECT: 1 YEARS — PRESENT YEAR IS 1st YEAR — REPORTING DATE: Progress Report Dec. 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$9,000	$9,000		

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

PL-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources, POLLUTION CONTROL *DATE:* April 1981

PROJECT TITLE: Development of an Experimental Marsh Treatment Facility at Listowel, Ontario

KEY WORDS: Listowel, Marsh, Experimental Marsh, Heavy Metals, Nutrients, Bacterial Contamination, Bulrushes, Harvesting Bulrushes

PRINCIPAL INVESTIGATOR AND AFFILIATION: Gore and Storrie Ltd.
M. Palmer. I. Wile, Water Resources Branch

LIAISON OFFICER OR SUPERVISOR: S. A. Black, Pollution Control Branch

RESEARCH CATEGORY: *INTERNAL* — *GRANT* — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* X — *MULTI-YEAR PROJECT* X — *CONCURRENT PROJECT* —

OBJECTIVE:

To establish a pilot artificial marsh sewage treatment system to: 1) determine the effectiveness of the system for reducing bacteriological contamination, heavy metals and nutrients on a year round basis; 2) to assess the cost of establishing and operating a marsh-type sewage treatment system in relation to presently accepted modes of treatment; 3) to seek the best design & operation of an artificial marsh system, including possible need for plant harvesting measures.

DESCRIPTION: The project will consist of the design, construction and monitoring of the pilot artificial marsh sewage treatment system. The system will occupy a total area of 2.5 acres and will provide for flexibility of operation in terms of retention times and quality and quantity of sewage influent. Both lagoon effluent and effluent from an aerated cell will be used. Some of the emergent vegetation cells will be channeled to permit plant harvesting. The system will be located on property owned by the Ministry of the Environment immediately adjacent to the Listowel sewage treatment facilities.

ANTICIPATED RESULTS: Natural marshes have been used successfully in the treatment of wastes. It is anticipated that artificial marshes will also be effective in reducing bacterial counts and other contaminants but information on design, construction costs, optimum operational modes and types of systems which may be effective in Ontario's climate is lacking.

The Listowel site offers an excellent opportunity to evaluate, through a pilot system, the practicality of using artificial marshes to reduce pollutants in the sewage discharges to surface waters.

DURATION OF PROJECT: 36 months *PRESENT YEAR IS:* — 4th YEAR Carry-over of unspent labour funds *REPORTING DATE:* 1982

BUDGET: Total to be paid with Lottery Funds = $335,340

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$489,340	$19,100	See below for Partners	

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* X — *OTHER* X Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

None. This Project is shared with Water Resources Branch and Southwestern Region

REMARKS:

Provincial Lottery Project No. 78-018-13 was originally funded as:

Provincial Lottery Capital Costs	=	$284,340
Provincial Lottery Labour Costs at Listowel	=	51,000
Southwestern Region	=	69,000
Water Resources Branch	=	85,000
TOTAL FOR 36 MONTHS FUNDING	=	$489,340

See page WR-11.

Ministry of the Environment
Ontario

PL-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT *DATE:* April 1981

PROJECT TITLE: The Study of Gas Production and Migration at Closed Landfill Sites

KEY WORDS: Methane, Garbage Site, Landfill Site, Gas Production, Migration of Garbage Gas, Explosion Hazard, Garbage Gas

PRINCIPAL INVESTIGATOR AND AFFILIATION: Hydrology Consultants Ltd.
1125 Dundas Street East, Mississauga, Ontario

LIAISON OFFICER OR SUPERVISOR: J. Petoia, Waste Management Branch

RESEARCH CATEGORY:
INTERNAL — *GRANT* —
UNSOLICITED CONTRACT — *SOLICITED CONTRACT* X
MULTI-YEAR PROJECT X — *CONCURRENT PROJECT* —

OBJECTIVE: To provide the Ministry of the Environment with information on patterns of gas production and migration at completed and active sanitary landfills and dumps as this relates to site after use and impacts on the use of adjacent lands.

DESCRIPTION: The Project will entail review and assessment of the state of the art of gas production and migration at selected closed sanitary and industrial waste landfill sites. Special testing will be required. Test areas selected will be based on composition, type and volume of waste and type and method of placement. Production and migration patterns of gases, resulting from man-made and natural processes and restrictions will also be investigated.

ANTICIPATED RESULTS:

- Development of a comprehensive state-of-the-art document on landfill gas production and migration and its control.
- Documentation of landfill gas production, migration problems and possible solution to problems in Ontario.
- Development of a data base describing gas production and migration of selected landfill sites in Ontario.
- Quantification of problems real or alleged that relate to landfill gas production and migration.
- Development of criteria that may be adopted as guidelines for use by the Ministry of the Environment regulating completed sanitary landfills.

DURATION OF PROJECT: 3 YEARS *PRESENT YEAR IS:* 3rd YEAR *REPORTING DATE:* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$287,500	None	None from M.O.E.	

SOURCE OF FUNDS:
REGULAR WORK PROGRAM —
SPECIAL MINISTRY FUNDING —
JOINTLY FUNDED PROJECT —
OTHER X Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: None.
This Lottery Project was taken over in FY 82/83 in its last year by Waste Management Branch and paid for by them. See Page WM-8

REMARKS: The information will be beneficial for the determination and selection of future uses of waste disposal areas. It will provide for efficient use of hitherto, unuseable land, which, due to urban development; now occupies prime areas. Results of the study are expected to aid thorough assessment of the necessary requirements for safely incorporating structures on or adjacent to completed solid waste disposal sites.
Provincial Lottery Project 78-023-13

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* April 1981

PROJECT TITLE: Ozone Application as an Alternative to Chlorine for Drinking Water Disinfection

KEY WORDS: Ozone, Drinking Water, Disinfection, Chlorine, Organics

PRINCIPAL INVESTIGATOR AND AFFILIATION: International Environmental Consultants Ltd.
D. G. Langley, K. L. Murphy

LIAISON OFFICER OR SUPERVISOR: A. Oda , Pollution Control Branch

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* X
MULTI-YEAR PROJECT X *CONCURRENT PROJECT* ——

OBJECTIVE: The study will identify and quantify by-products which may be formed in drinking water during ozonation and during ozonation - chlorination.

The study will determine the toxicity and potential health hazard of by-products formed during ozonation and during ozonation - chlorination. The by-products will be compared with those formed when drinking water is subjected to conventional chlorination.

DESCRIPTION: A detailed literature search will be on-going for the duration of the study. Experimental laboratory research will be undertaken on raw water from three representative municipalities to measure organic by-products from ozonation, chlorination, ozone/chlorination and ozone/chloramination and to establish the effects of water chemistry and process variables on these by-products. The potential public health effects of the disinfection by-products will be measured by Ames Salmonella/microsome testing for mutagenisis. A pilot scale ozone facility will be installed at Brantford to treat Grand River water for three periods in spring, late summer, and late fall of 1980. Experimental parameters will include ozone dosage, delay time between ozonation and chlorination, and storage time after chlorination,

Special emphasis will be placed on the comparative effectiveness of the combined ozonation-chlorination process in terms of disinfecting water supplies and long-term health implications of any by-products which may be produced.

DURATION OF PROJECT: 3 YEARS *PRESENT YEAR IS:* 3rd YEAR *REPORTING DATE:* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$214,680	$9,200	None from MOE	

SOURCE OF FUNDS:
REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER X Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS: A detailed report will be submitted upon completion of the research which will include cost estimates for add-on ozonation. Operating guidelines for ozone application as an alternative to chlorine disinfection of drinking water will be presented. Information on reduction of potential mutagenic and carcinogenic compounds in drinking water in Ontario should result from this Project.

Provincial Lottery Project 79-027-13

See Page LS-21.

Ministry of the Environment
Ontario

PL-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* April 1981

PROJECT TITLE: Effect of Hydraulic Characteristics and Effluent Chlorination on the Incidence of Microorganisms of Public Health Significance in Receiving Waters

KEY WORDS: Hydraulic Characteristics, Effluent Chlorination, Chlorination, Microorganisms, Public Health, Receiving Waters, Disinfection

PRINCIPAL INVESTIGATOR AND AFFILIATION Beak Consultants Ltd.
S.L. Hodd

LIAISON OFFICER OR SUPERVISOR A. Vajdic, Pollution Control Branch

RESEARCH CATEGORY:
INTERNAL — *GRANT* —
UNSOLICITED CONTRACT — *SOLICITED CONTRACT* X
MULTI-YEAR PROJECT X *CONCURRENT PROJECT* —

OBJECTIVE:
- to determine the incidence of pathogenic bacteria and indicator bacteria in sewage treatment plant effluents and their receiving waters;
- to determine if chlorination results in a significantly lower concentration of pathogenic bacteria than for the case of unchlorinated effluents;
- to investigate those hydrological, water quality and atmospheric conditions that contribute to the natural die-off of pathogenic bacteria in non-chlorinated effluents and their receiving waters;
- to determine the need and desirability to use selected pathogenic bacteria in place of indicator organisms as indicators of conditions hazardous to public health in effluents and receiving waters in Ontario.

DESCRIPTION: This project is to be carried out over a three year period and will investigate two sewage treatment plants and their receiving waters each study year. The first phase will include two rivers, the second a river and a lake. Microbiological tests for indicator and pathogenic bacteria will be performed in a mobile field laboratory on the site. The corresponding hydrological surveys will investigate and measure all significant factors which influence bacterial growth and mortality.

DURATION OF PROJECT 3 YEARS *PRESENT YEAR IS* 3rd YEAR *REPORTING DATE* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$278,700	$4,300	None from MOE	

SOURCE OF FUNDS:
REGULAR WORK PROGRAM —
SPECIAL MINISTRY FUNDING —
JOINTLY FUNDED PROJECT —
OTHER X Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS: The results of this investigation should logically lead to the development of guidelines and criteria for effluent disinfection in Ontario.

Provincial Lottery Project 79-028-13
See Page LS-22.

Ministry of the Environment
Ontario

PL-5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES *DATE:* April 1981

PROJECT TITLE: Characterization and Identification of Organic Substances in Drinking Water

KEY WORDS: Drinking Water, Organics, Analysis of Organics in Water

PRINCIPAL INVESTIGATOR AND AFFILIATION: Ontario Research Foundation
G. H. Thomas, B. S. Das

LIAISON OFFICER OR SUPERVISOR: D. Smillie, Laboratory Services Branch

RESEARCH CATEGORY:
INTERNAL — *GRANT* —
UNSOLICITED CONTRACT — *SOLICITED CONTRACT* X
MULTI-YEAR PROJECT X *CONCURRENT PROJECT* —

OBJECTIVE: The objectives of this project are the identification and quantification of organic compounds amenable to analysis in the raw and finished water at two selected sites in Southern Ontario. The variability with respect to the presence and concentration of these compounds will be studied on a time basis in order to establish potential seasonal variations.

DESCRIPTION: The Ministry has accumulated considerable data on selected organics from a number of water treatment plants in Ontario. However, it is considered appropriate to identify and quantify a more complete spectrum of organic compounds at such plants. Such compounds would range from the very volatile polar and non-polar (e.g. acetone and chloroform), medium volatile (e.g. pesticides and phenols), non-volatile (e.g. carbohydrates, aromatic acids) to polymeric material (e.g. humic acids, celluloses).

ANTICIPATED RESULTS:

It is anticipated that suitable concentration techniques for a complete range of organics in water will be developed, Concommitantly, suitable identification and quantification procedures will also be developed.

DURATION OF PROJECT — 3 — *YEARS* *PRESENT YEAR IS* 3rd *YEAR* *REPORTING DATE* 1982

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$200,000	$14,000	None from MOE	

SOURCE OF FUNDS:
REGULAR WORK PROGRAM —
SPECIAL MINISTRY FUNDING —
JOINTLY FUNDED PROJECT —
OTHER X Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Provincial Lottery Project 79-031-12

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* April 1981

PROJECT TITLE: A Study to Evaluate Urban Road Dust as a Source of Suspended Particulates

KEY WORDS: Hamilton, Dust, Urban Road Dust, Suspended Particulates, Air Contamination in Cities

PRINCIPAL INVESTIGATOR AND AFFILIATION: Ontario Research Foundation, Toronto, Ontario

LIAISON OFFICER OR SUPERVISOR: D. Corr, Air Resources Branch

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* —— *UNSOLICITED CONTRACT* X *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X *CONCURRENT PROJECT* ——

OBJECTIVE:

- to develop an abatement strategy for particulate matter in the City of Hamilton by chemical and physical urban dust characterization, source identification, and an evaluation of available control technologies;
- to use the results to define optimum methodologies for the development and evaluation of a particulate matter control strategy for urban areas on a nationwide basis.

DESCRIPTION: An intensive field study will be carried out in Hamilton in order to determine detailed chemical and physical characteristics of urban dust and its temporal variation. The effect of different street cleaning methods will be assessed. Data will be analysed to identify sources of urban dust and optimum technologies for street cleaning. Based on these results a cost effective control strategy will be identified.

The reduction of suspended particulate matter concentrations in urban areas, primarily through the reduction of emissions from traditional industrial sources, has been the object of considerable effort and expense by both government and industry for many years. Continued efforts in this area are expected and the results of this study will be of assistance in providing a sound scientific basis for the definition of the relative importance of various types of sources and the identification and implementation of cost-effective control strategies.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 3rd *YEAR* *REPORTING DATE* 1981

BUDGET: MOE Share of Total is $177,000 FY 80/81 = $134,000

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$452,000 for all Partners	for MOE $48,000	None from MOE	

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* X *OTHER* X Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: Partners in this project are Dofasco, Stelco, Environment Canada and City of Hamilton.

REMARKS: Implementation of the control strategy identified in this study will lead to improved air quality in Hamilton by reducing the concentrations of suspended particulate matter. The cost of this improvement will be minimized by the identification of an optimum cost effective control strategy. The study will develop a method for such strategy development which can be applied to other urban areas at a much reduced cost.

Provincial Lottery Project 79-032-32

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL, WATER RESOURCES *DATE:* April 1981

PROJECT TITLE: Rideau River Storm Water Management Study, Ottawa, Ontario.

KEY WORDS: Urban Drainage, Stormwater Runoff, Kennedy-Burnett Pond, Rideau River Study, Flooding, Impoundment, Swimming Beaches, Combined Sewer Pollution

PRINCIPAL INVESTIGATOR AND AFFILIATION Regional Municipality of Ottawa, Carleton

LIAISON OFFICER OR SUPERVISOR D. G. Weatherbe, Water Resources Branch

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X *CONCURRENT PROJECT* ——

OBJECTIVE:
The study will recommend a comprehensive stormwater management plan for the Regional Municipality of Ottawa-Carleton in the drainage area of the Rideau River. It will assist implementation of urban growth projections as incorporated in the Region's Official Plan. It will improve the present poor water quality and allow for better recreational activities on the Rideau River. Study findings may be applied to other watersheds in the Province.

DESCRIPTION:
An extensive environmental project, the Rideau River Stormwater Management Study has been proposed for Ottawa-Carleton Region. The Regional Municipality will administer the study and act as prime contractor. The City of Ottawa, the City of Nepean and Environment Canada will also contribute in collaboration with the Ministry of the Environment.

The Region of Ottawa-Carleton has undergone considerable urban development. The population of over 500,000 is mainly located in the City of Ottawa, the City of Nepean and Gloucester Township, in the watershed of the Rideau River. The official plan for the Region has intentions for a further population increase, of which 100,000 would be adjacent to the river in the South Urban Community.

However, the watershed has already suffered serious environmental damage, through pollution of the river and tributary creeks. Certain bathing area have been closed for some time because of health hazards from bacterial pollution, particularly following rainstorms.

DURATION OF PROJECT 3 *YEARS* *PRESENT YEAR IS* 3rd *YEAR* *REPORTING DATE* 1983

BUDGET: M.O.E.'s share is $750,000

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$1,484,000	Nil from Lottery Funds		None from M.O.E.

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* X *OTHER* X Provincial Lottery

IS A REPORT ANTICIPATED? Yes.

PARTICIPATION BY OTHER MINISTRIES: No. Partners are Regional Municipality of Ottawa-Carleton, Environment Canada, City of Ottawa, City of Nepean.

REMARKS:

Provincial Lottery Project 79-037-33 (Rideau River Study)
See Provincial Lottery Project 79-030-33, (Kennedy-Burnett Study)
See Page LS-29.

Ministry of the Environment
Ontario

PL-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: AIR RESOURCES *DATE:* April 1981

PROJECT TITLE:

Assessment of Human Exposure to Air Pollution

KEY WORDS: Air Pollution, Human Exposure, Indoor-Outdoor Pollution, Personal Monitors

PRINCIPAL INVESTIGATOR AND AFFILIATION: Frances Silverman, Ph.D., Sheldon Mintz, M.D.
The Gage Research Institute, Department of Medicine, University of Toronto

LIAISON OFFICER OR SUPERVISOR: Denis Corr, Air Resources Branch

RESEARCH CATEGORY:
INTERNAL —— *GRANT* X
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT X *CONCURRENT PROJECT* ——

OBJECTIVE:

1. to calibrate and validate personal, indoor and outdoor monitors to assess human exposure to air pollution (particulates, sulphur dioxide and nitrogen dioxide).
2. to use these monitors in the field to assess human exposure to particles, SO_2 and NO_2.
3. to provide data from these studies on the relationships between these modes of measuring exposure to air pollution and assess which gives the most realistic estimate of exposure.

DESCRIPTION:

Studies of health effects of air pollution are critically dependent upon quantitation of amount of pollutant exposure. Unfortunately, there are major differences between air pollution levels measured at fixed air pollution monitoring stations, and inside and outside buildings at a distance from these stations; persons going about their activities encounter yet different amounts of pollutants. To investigate these relationships, a small portable monitor has been developed which (with minor design changes) can measure SO_2, NO_2 and particulates in all of these circumstances. A study of the health effects of these pollutants on 90 asthmatics and non-asthmatics will be undertaken.

An awareness of the relationships between personal and fixed station air pollution levels will allow rational air pollutant quality control criteria to be formulated. Furthermore, the use of personal monitors may allow identification of significant sources of air pollution within the home, a factor which is important in air pollution abatement programs.

DURATION OF PROJECT: 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$99,500	Nil	None from M.O.E.	

SOURCE OF FUNDS:
REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT X
OTHER X Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: Provincial Lottery Trust Fund pays 35.5% ($61,735) of the total cost of this Project which is $173,470. The other partners paying 64.5% of the total cost is H. & W. Canada.

REMARKS: This project was bridge funded with Lottery Funds between October 1, 1979 and March 31, 1980. Support for the project was renewed for an additional two years between June 1, 1980 and May 31, 1982.

Provincial Lottery Project 79-040-31.

Ministry of the Environment
Ontario

PL-9

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* April 1, 1981

PROJECT TITLE: Development of Non-Chemical Approaches to Pest Control (Sterile Male Onion Maggot Technique).

KEY WORDS: Non-Chemical Pesticides, Sterile Male Onion Maggot, Onion Control, Biological Control, Pest Control

PRINCIPAL INVESTIGATOR AND AFFILIATION: F. L. McEwen
University of Guelph, Guelph, Ontario.

LIAISON OFFICER OR SUPERVISOR: D. Wilson, Pollution Control Branch

RESEARCH CATEGORY: *INTERNAL* — *GRANT* X — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* X — *CONCURRENT PROJECT* —

OBJECTIVE:

To construct a facility for mass rearing and quarantine of insects used for biological control and for mass rearing of insects for sterile male release in integrated pest management programs. To conduct a field experiment in which sterile onion maggots are released in sufficient quantity to compete with wild flies in the field and prevent their reproduction. The Keswick Marsh (about 300 acres of onions) will be used as the test site. The nature of the trial is such that it will require one year after the building is completed before 100,000,000 flies will be produced and available for release. It will then be necessary to have two years of field programs of release.

DESCRIPTION:

Recognizing the inadequacy of chemicals to control our pest prohlems, many researchers have studied alternatives and it is now clear that a pest management approach embodying the integration of chemicals and biological controls is a sound tactic.

Led by studies in the United States, the culture and release of sterilized insects has achieved outstanding success with the screwworm and certain tropical fruit flies and in Holland and Ontario, this method appears feasible for onion maggot and possibly carrot rust fly and carrot weevil.

To develop a center of expertise in non-chemical approaches to pest control and to integrate these approaches into effective pest management programs. At the end of the grant period, the University accepts responsibility for the maintenance and operation of the facility as an integral part of its ongoing research program.

DURATION OF PROJECT 3 *YEARS* — *PRESENT YEAR IS* 1st *YEAR* — *REPORTING DATE* 1984

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$237,500	$110,000	None from M.O.F.	

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* X — *OTHER* X Provincial Lottery

IS A REPORT ANTICIPATED? Yes.

PARTICIPATION BY OTHER MINISTRIES: Ministry of Agriculture and Food and Agriculture Canada.

REMARKS:

O.M.A.F. funded the project alone in FY 80/81.

Provincial Lottery Project 79-042-33.

Ministry of the Environment
Ontario

PL-10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WATER RESOURCES *DATE:* April 1981

PROJECT TITLE: Attenuation in Ground Water of Inorganic Contaminants from Sanitary Landfills on Sandy Unconfined Aquifers.

KEY WORDS: Leachates, Sandy Aquifers, Sanitary Landfills, Attenuation of Leachate

PRINCIPAL INVESTIGATORS AND AFFILIATION: J. A. Cherry, J. F. Barker, E. J. Reardon, University of Waterloo, Waterloo, Ontario.

LIAISON OFFICER OR SUPERVISOR: G. Hughes, Water Resources Branch

RESEARCH CATEGORY: *INTERNAL* — *GRANT* X — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* X — *CONCURRENT PROJECT* X

OBJECTIVE: The specific objectives of the proposed research are: (i) to determine the degree of attenuation of a large number of inorganic contaminants in shallow groundwater at a selected number of landfills situated on sandy unconfined aquifers and (ii) to develop an interpretive hydrogeological and hydrogeochemical framework to account for the observed patterns of contaminant attenuation. The ultimate aim of this research is to provide for an improved methodology for predicting the degree of attenuation that will occur at sandy sites at which new landfills may be proposed for development.

DESCRIPTION: A preliminary version of a hydrogeochemical and hydrodynamic framework to account for the attenuation of inorganic landfill-derived contaminants in sandy deposits was developed during a three-year investigation of an abandoned landfill at CFB Borden, Ontario. In this new research project, we intend to develop a more comprehensive methodology for attenuation prediction and to test the methodology by application to two sites that are much different than the Borden site. These sites are the major landfill that serves the city of North Bay and the Woolwich landfill, which serves the northern part of the Region of Waterloo. A detailed network of multi-level groundwater monitoring devices will be installed at each site and soil samples will be analysed for parameters used in attenuation prediction. Detailed maps of contaminant concentrations in the ground water zone will be produced for comparison to predicted distributions.

DURATION OF PROJECT: 3 YEARS *PRESENT YEAR IS:* 2nd YEAR *REPORTING DATE:* March 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$116,000	Nil	None from MOE	

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* X Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No.

REMARKS:

Provincial Lottery Project 79-044-33.

Ministry of the Environment
Ontario

PL-11

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* APRIL 1981

PROJECT TITLE: Investigation of Sleep Disturbance Effects of Road Traffic Noise

KEY WORDS: Noise, Sleep Disturbance, Traffic Noise, Road Traffic Noise

PRINCIPAL INVESTIGATOR AND AFFILIATION: S. S. Wilson, S. S. Wilson and Associates, 177 Finch Avenue West, Suite 23, Downsview, Toronto, Ontario M3J 2E9

LIAISON OFFICER OR SUPERVISOR: J. Manuel, Pollution Control Branch

RESEARCH CATEGORY:
INTERNAL — *GRANT* —
UNSOLICITED CONTRACT X *SOLICITED CONTRACT* —
MULTI-YEAR PROJECT X *CONCURRENT PROJECT* —

OBJECTIVE:

The determination of relationship between road traffic noise levels and sleep disturbance with a view to providing recommended road traffic noise level limits in relation to perceived health effects.

The comparative analysis of objective measurements of sleep disturbance and existing subjective data on annoyance levels due to traffic noise to determine whether or not a direct correlation exists. These results can be used to determine if acceptable indoor noise levels due to road traffic can be directly related to subjective studies.

The provision of further data as to the possible relationship between total daily noise exposure and subsequent sleep effects.

DESCRIPTION:

The study will entail a program of objective measurements of sleep disturbance by road traffic noise in a real life situation coupled with a review of the literature existing on subjective studies on human response to noise. The objective/subjective data will be analysed and assessed for correlation.

Noise level limits will be recommended for indoor living environments based upon possible health impairment effects due to sleep disturbance.

The study will also provide further data on the relationship between actual measurements and subjective data acquired by interviews and between total daily noise exposure and subsequent sleep effects.

DURATION OF PROJECT: 2 *YEARS* *PRESENT YEAR IS:* 1st *YEAR* *REPORTING DATE:* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$153,000	$53,400	None from M.O.E.	

SOURCE OF FUNDS:
REGULAR WORK PROGRAM —
SPECIAL MINISTRY FUNDING —
JOINTLY FUNDED PROJECT —
OTHER X Provincial Lottery

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

The study will provide recommended outdoor noise level limits for living areas in residences to be built in new developments adjacent to sources of traffic noise (highways, collector roads, arterial roads, etc.). These recommended limits will be based on the relationship between road traffic noise and sleep disturbance as determined from actual measurements on subjects in their normal sleeping environment.

MOE 1293 8/78

Provincial Lottery Project 80-047-32.

Ministry of the Environment
Ontario

PL-12

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WATER RESOURCES *DATE:* APRIL 1981

PROJECT TITLE: Aquatic Toxicity Studies of Multiple Organic Compounds

KEY WORDS: Aquatic Toxicity, Organics in Water, Lakehead University, Industrial Wastes, Fish Testing, Biological Testing, Hazardous Compounds.

PRINCIPAL INVESTIGATOR AND AFFILIATION: Dr. G. W. Ozburn and Dr. D. E. Orr, Department of Biology, Lakehead University, Thunder Bay, Ontario P7B 5E1

LIAISON OFFICER OR SUPERVISOR: G. R. Craig, Water Resources Branch

RESEARCH CATEGORY: *INTERNAL* — *GRANT* X — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* X — *CONCURRENT PROJECT* X

OBJECTIVE:

To determine the effective biological concentrations of selected organics commonly discharged in industrial wastes.

The effects of individual industrially related organic compounds on fish reproduction as well as rates of accumulation and depuration of those organics will be determined. Mixtures of the individual organics will also be tested to determine their joint toxicity effects on the same biological parameters.

DESCRIPTION:

Exposure of flagfish to these selected organics will identify concentrations that impair or inhibit egg production, hatching success, fry survival and growth. Bio-concentration factors due to uptake from water will also be determined. Rates of uptake through food will be determined in rainbow trout to establish food chain effects.

Once individual organic effects are established, mixtures of those organics representative of concentrations found in river systems will be tested to determine synergistic, additive or antagonistic effects on reproduction and bio-accumulation.

Concentrations of industrial organic compounds that produce detrimental effects on fish reproduction and recruitment will be established. Levels of organics accumulation that impair or reduce the edibility of sport and commercial fish will be determined in light of biological, chemical and mutagen/carcinogen studies reported in the literature or under study in other environmental laboratories.

DURATION OF PROJECT: 3 YEARS *PRESENT YEAR IS* 2nd YEAR *REPORTING DATE* 1984

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$340,440*	$32,600 from M.O.E.	None from M.O.E.	

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* — *SPECIAL MINISTRY FUNDING* X — *JOINTLY FUNDED PROJECT* — *OTHER* X Provincial Lottery Fund

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

No. This project is supported in FY 80/81 with Bridge Funding from Lottery Project No. 48 for $10,900.

REMARKS:

Partners in FY 80/81 were Environment Canada and M.O.E. Hazardous Contaminants Co-ordinator. Provincial Lottery Project No. 80-049-33.

* Contribution from Lottery Funds is one half, e.g. $170,220.
See Page WR-34.

MOE 1293 6/76

Ministry of the Environment
Ontario

PL-13

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* June 1982

PROJECT TITLE:

EXPENSES OF PROVINCIAL LOTTERY TECHNOLOGY TRANSFER

KEY WORDS: Technology Transfer, Publications, Report Printing, Report Compilation, Conference Information

PRINCIPAL INVESTIGATOR AND AFFILIATION No contract or grant was issued in connection with this Project

LIAISON OFFICER OR SUPERVISOR Secretary, M.O.E. Research Advisory Committee

RESEARCH CATEGORY: *INTERNAL* X *GRANT* — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* X *CONCURRENT PROJECT* —

OBJECTIVE:

As a result of funding Provincial Lottery Projects, the Research Advisory Committee will generate some expenses in the realm of Technology Transfer. These expenses are for the publication of Conference Proceedings describing Projects supported with Lottery Funds and printing of certain reports on Lottery Projects whose publication is not otherwise paid for by the "original" funding of the Lottery Project. The R.A.C. also will generate other expenses in regard to a Workshop on M.O.E. Research Needs which is expected to enhance the wise selection of research work undertaken by M.O.E. funds.

DESCRIPTION:

1. The publication of Conference Proceedings No. 1, No. 2 and No. 3, will document 40 - 50 papers primarily on the subjects covered by completed Lottery projects and these Proceedings will be distributed to the normal sources receiving M.O.E. reports and attendees at the Conference.
2. The staging of the Research Needs Workshop will serve to identify, develop and prioritize M.O.E. Research Needs.
3. The publication of selected "Lottery Project" reports when considered worthy of wide distribution will add to the literature on pollution abatement and human environmental health.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* No Report

BUDGET:

	TOTAL DOLLARS		*MAN YEARS*	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$6,000	$6,000	$3,300	None	None

SOURCE OF FUNDS: Provincial Lottery Trust Funds — *REGULAR WORK PROGRAM* — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? No

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS: Provincial Lottery Project No. 81-052-21

Ministry of the Environment
Ontario

PL-14

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* JUNE 1982

PROJECT TITLE: A NEW POTABLE WATER TREATMENT METHOD FOR TRIHALOMETHANE PRECURSOR AND SYNTHETIC ORGANIC REMOVAL

KEY WORDS: Drinking Water, Organics Removal, Trihalomethane, Aluminum Chloride, Zenon

PRINCIPAL INVESTIGATOR AND AFFILIATION: Zenon Environmental Enterprises Ltd. Attention: A. Benedek
42 Ray Street, South, Hamilton, Ontario L8P 3V3.

LIAISON OFFICER OR SUPERVISOR: R. Hunsinger

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* —— *UNSOLICITED CONTRACT* X *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X *CONCURRENT PROJECT* ——

OBJECTIVE: The evaluation of the organic removal efficiency of conventional coagulants, e.g., alum, alum plus activated silica, alum plus polyelectrolyte, ferric chloride, activated carbon.

The evaluation of the organic removal capability of some coagulants/adsorbents, e.g., Polymerized Basic Aluminum Chloride (PBAC), Polymerized Aluminum Chloro Sulphate (PACS).

The determination of the operating organic removal mechanisms and the levels of coagulant/adsorbent residues from the most important chemicals.

The evaluation of the optimum concentration, addition mode, and contacting equipment for the most promising chemical or chemical combinations. The recommendation of an optimum organic removal system for the different waters found in Ontario.

DESCRIPTION:

To develop the framework for applying a new coagulant/adsorbent.

To summarize the conclusions of the study and to recommend detailed plans for pilot studies of the proposed system.

To establish the base case for comparison with the new coagulants/adsorbents.

To verify relative efficiencies of new coagulants/adsorbents.

To determine the optimum organic removal characteristics of the new coagulants and to examine inorganic residuals introduced into the water by the new coagulants.

The proposal examines new coagulant adsorbents for the removal of synthetic organics and trihalomethane precursors from drinking water. It is believed that the technology examined in this proposal has the best potential for a low cost technology suitable for alleviating the level of synthetic organics.

DURATION OF PROJECT: 2 YEARS *PRESENT YEAR IS:* 1st YEAR *REPORTING DATE:* 1983

BUDGET: Total Contract=$249,000 *TOTAL DOLLARS*

	TOTAL PROJECT	*CURRENT YEAR*	*MAN YEARS* *TOTAL PROJECT*	*CURRENT YEAR*
MOE's share	$30,000	$10,000	None	None

SOURCE OF FUNDS: Provincial Lottery Trust Funds — *REGULAR WORK PROGRAM* —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* X —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No
Health and Welfare Canada is a partner.

REMARKS:

Provincial Lottery Project No. 81-053-32
$30,000 is M.O.E.'s share of the total project.
See Page LS-23.

Ministry of the Environment
Ontario

PL-15

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* JUNE 1982

PROJECT TITLE: APPLICATION OF ULTRA VIOLET DISINFECTION TECHNOLOGY IN ONTARIO W.P.C.P. EFFLUENTS

KEY WORDS: Ultra Violet Disinfection, Standard Biological Laboratories, W.P.C.P. Effluent Disinfection, Effluent Treatment

PRINCIPAL INVESTIGATOR AND AFFILIATION: Standard Biological Laboratories
514-516 Lakeshore Road, East, Mississauga, Ontario

LIAISON OFFICER OR SUPERVISOR: T. Ho

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* —— *UNSOLICITED CONTRACT* X *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X *CONCURRENT PROJECT* ——

OBJECTIVE:
1. To evaluate the applicability of UV disinfection technology in different tertiary and secondary WPCP effluent typically produced in Ontario.
2. To define the relative UV disinfection efficiency and magnitude of photo-reactivation of total/fecal coliforms to three selected pathogenic bacteria.
3. To develop design criteria for UV disinfection technology.

DESCRIPTION:
The study will be conducted with a pilot-scale proprietary UV disinfection unit. Eight WPCP's will be monitored in Phase 1. Relative UV disinfection efficiency and magnitude of photo-reactivation of total/fecal coliforms to pathogens will be studied at three UV dosages in each WPCP. The long-term performance and reliability of UV disinfection attainable by the optimum UV dosages determined in Phase 1 will be tested in four of the eight WPCP's in Phase 2. Ten months will be required for Phases 1 and 2 field activities, and an additional two months will be required for reporting.
1. The study will determine if UV disinfection technology can be broadly applied to most secondary WPCP's in Ontario, or will be restricted only to high quality seconday effluents.
2. The relative UV disinfection efficiency and magnitude of photo-reactivation of total/fecal coliforms to pathogenic bacteria data will enable:
(a) an adequate "end-of-the-pipe" bacteriological quality to be established for UV disinfection;
(b) establish process design guidelines for UV disinfection technology.

DURATION OF PROJECT: 2 *YEARS* *PRESENT YEAR IS* 2nd *YEAR* *REPORTING DATE* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$40,750	$17,800	None	None

SOURCE OF FUNDS: Provincial Lottery Trust Funds — *REGULAR WORK PROGRAM* —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS: Provincial Lottery Project No. 81-054-32
See Page LS-26.

Ministry of the Environment
Ontario

PL-16

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES *DATE:* JUNE 1982

PROJECT TITLE: CHEMICAL IDENTIFICATION AND BIOLOGICAL ASSAY STUDIES OF ENVIRONMENTAL MUTAGENS, PROMOTERS AND INHIBITORS

KEY WORDS: Mutagens, Promoters, York University, Hazardous Contaminants, Carcinogens, Airborne Mutagens, Waterborne Mutagens

PRINCIPAL INVESTIGATOR AND AFFILIATION York University, 4700 Keele Street, Downsview, Toronto, Ontario M3J 1P3 Attention: M. Katz

LIAISON OFFICER OR SUPERVISOR D. Rokosh

RESEARCH CATEGORY:
INTERNAL —— *GRANT* X
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT X *CONCURRENT PROJECT* ——

OBJECTIVE:

1. To utilize newly developed bio-assay systems to determine the mutagenic activity and carcinogenic potential of toxic environmental pollutants.
2. To separate and identify quantitatively the PAH and other potentially mutagenic and carcinogenic organic compounds from the polluted water environment.
3. To determine which chemicals or combinations of chemicals are responsible for mutagenic activity.
4. To determine which substances can act as promoters and which substances can act as inhibitors of mutagenic or carcinogenic chemicals.
5. To investigate the effect of mutagenic chemicals on plants grown in greenhouses and on fish living in fish tanks.

DESCRIPTION:

It is planned to utilize newly developed, rapid, accurate and economical in vivo bio-assay systems to determine the mutagenic and carcinogenic potential of various combinations of chemicals found in the air and water environments. It is also planned to investigate substances that act as promoters and other chemicals that can effectively inhibit the mutagenic potency of various chemical mixtures. Mice and fish will be used as test animals. The tier testing strategy will include a spectrum of genetic toxicity tests including bacterial mutagenicity, in vivo and/or in vitro sister chromated exchange, in vivo chromosomal aberrations (micronuclei) and in vivo sperm head abnormalities.

DURATION OF PROJECT 3 YEARS *PRESENT YEAR IS* 2nd YEAR *REPORTING DATE* 1984

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$452,844	$146,129	None	None

SOURCE OF FUNDS: Provincial Lottery Trust Funds
REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS: Provincial Lottery Project No. 81-055-33

Ministry of the Environment
Ontario

PL-17

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: PROGRAM PLANNING & EVALUATION DATE: JUNE 1982

PROJECT TITLE: CONTROLLING SULPHUR DIOXIDE EMISSIONS.

KEY WORDS: Air Pollution Costs, Sulphur Dioxide Emissions, University of Toronto, Stack Emissions

PRINCIPAL INVESTIGATOR AND AFFILIATION: University of Toronto, Toronto, Ontario M5S 1A4
Attention: A. P. Grima

LIAISON OFFICER OR SUPERVISOR: R. Warner

RESEARCH CATEGORY: INTERNAL ___ GRANT X UNSOLICITED CONTRACT ___ SOLICITED CONTRACT ___ MULTI-YEAR PROJECT ___ CONCURRENT PROJECT ___

OBJECTIVE:

The proposed research would examine the economics of existing and increasingly stringent SO_2 emission controls in either the Sarnia or Nanticoke Industrial Complexes: alternative enforcement policies will also be examined. Final selection of the case study area will depend upon data availability for the empirical analysis.

DESCRIPTION:

The research would be completed in three phases. Phase one would involve reviewing the technological options for SO_2 control within fossil-fueled generating stations, petroleum refining and the steel industry in terms of SO_2 removal efficiency and associated costs. In the second phase, we would use the cost estimates from phase one to construct incremental or marginal cost-of-abatement curves. These curves, unlike average cost figures, will show the increment which occurs in total cost when an additional unit of control is exercised. Finally, having estimated the economic consequences of complying to SO_2 regulations, the cost-of-abatement of alternative SO_2 enforcement policies would be examined.

It is expected that the cost of pollution control for SO_2 treatment will rise as the level of emission is decreased. Further, it is anticipated that comparisons among alternative pollution control enforcement policies will show that regulatory systems by themselves may not always be the most cost-effective policy instrument.

DURATION OF PROJECT: 1 YEARS PRESENT YEAR IS 1st YEAR REPORTING DATE 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$30,000	$30,000	None	None

SOURCE OF FUNDS: Provincial Lottery Trust Funds — REGULAR WORK PROGRAM ___ SPECIAL MINISTRY FUNDING ___ JOINTLY FUNDED PROJECT ___ OTHER ___

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Provincial Lottery Project No. 81-056-32

Ministry of the Environment
Ontario

PL-18

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: POLLUTION CONTROL *DATE:* JUNE 1982

PROJECT TITLE: ENVIRONMENTAL SIGNIFICANCE OF SEWAGE LAGOONS IN ONTARIO

KEY WORDS: Sewage Lagoons, Organisms in Sewage Lagoons, Limnos Ltd. Effluents from Lagoons, Lagoon Biota

PRINCIPAL INVESTIGATOR AND AFFILIATION: Limnos Ltd., 22 Roe Avenue, Toronto, Ontario M5M 2H7
Attention: John H. Neil

LIAISON OFFICER OR SUPERVISOR: Ivy Wile

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* —— *UNSOLICITED CONTRACT* X *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

To assess the potential for the dissemination of environmental contaminants through uptake by aquatic organisms growing in Ontario sewage Lagoons.

DESCRIPTION:

The conduct of the study will evaluate and report on:
1. Published information assembled through an N.R.C. literature search.
2. Effluent and biota analyses as may be available from MOE, Limnos or data of other researchers.
3. Expert opinion provided by recognized specialists in the field of public health pertaining to disease, parasites and toxic metals and organic compounds.

ANTICIPATED RESULTS:

The provision of a report of findings which reports on information provided by the literature and unpublished data. The data obtained will be evaluated with the help of experts in their respective fields and reported on together with any recommendations that may become apparent as a result of the study.

DURATION OF PROJECT: 4 MONTHS *YEAR IS* 1981 1st YEAR *REPORTING DATE* 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$5,900	$5,900	None	None

SOURCE OF FUNDS: Provincial Lottery Trust Funds — *REGULAR WORK PROGRAM* —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Final Report received in April 1982

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Provincial Lottery Project No. 81-057-31.
The $5,900 was paid using FY 81/82 Funds.

MOE 1293 6/76

Ministry of the Environment
Ontario

PL-19

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WATER RESOURCES *DATE:* JUNE 1982

PROJECT TITLE:

FIELD MEASUREMENTS INFILTRATION THROUGH LANDFILL COVERS

KEY WORDS: Infiltration into Landfills, Landfill Sites, Gartner Lee Associates, Lysimeters

PRINCIPAL INVESTIGATOR AND AFFILIATION Gartner Lee Associates, Buttonville Airport, Markham, Ontario L3P 3J9. Attention: P. K. Lee

LIAISON OFFICER OR SUPERVISOR

RESEARCH CATEGORY:
INTERNAL — *GRANT* —
UNSOLICITED CONTRACT X *SOLICITED CONTRACT* —
MULTI-YEAR PROJECT X *CONCURRENT PROJECT* —

OBJECTIVE:

To collect field measurements of the actual amount of water which infiltrates through various types of covers under various conditions at landfill sites. The data collected will be tested for reproducibility and compared to the results expected using the empirical calculations of infiltration.

DESCRIPTION:

Through a program of close liaison with the M.O.E. and other regulatory and research bodies, 3 prototype lysimeter systems will be designed and constructed. These systems will be monitored for 12 months and the data analysed and checked for consistency. Additional lysimeter systems incorporating various cover materials and physical settings will then be constructed and monitored. A complete analysis and assessment of the results will be undertaken.

Upon completion of the study, we should know the effect of various types of cover materials, installed under various settings, on the volume of water which can reasonably be expected to infiltrate through the covers. The empirical values which are currently used in cover design can be checked against the field measurements and the equations modified accordingly.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$29,700	$29,700	None	None

SOURCE OF FUNDS: Provincial Lottery Trust Funds
REGULAR WORK PROGRAM —
SPECIAL MINISTRY FUNDING —
JOINTLY FUNDED PROJECT —
OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Provincial Lottery Project No. 81-058-12

See Page WR-5.

Ministry of the Environment
Ontario

PL-20

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: LABORATORY SERVICES *DATE:* JUNE 1982

PROJECT TITLE: LITERATURE SEARCHES REGARDING THE POTENTIAL GENOTOXIC HAZARDS OF SPECIFIC ENVIRONMENTAL CONTAMINANTS

KEY WORDS: Genotoxic Hazards, Environmental Contaminants, York University

PRINCIPAL INVESTIGATOR AND AFFILIATION: York University, 4700 Keele Street, Toronto, Ontario
Attention: D. M. Logan

LIAISON OFFICER OR SUPERVISOR: M. Salamone

RESEARCH CATEGORY: *INTERNAL* X *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

The objective of this study is to determine, by using literature searches, the potential genotoxic hazards, if any, of specific environmental contaminants, from both anthropogenic and indigenous sources.

1. To provide an awareness of information available on these potentially genotoxic hazards.
2. To provide a direction for the Ministry relative to the detection of environmental genotoxic hazards.

DESCRIPTION:

Literature searches are to be requested from the Rand Corporation and the Envrionmental Mutagen Information Centre (EMIC) on the available mutagenic, carcinogenic and teratogenic test data for the following potential sources of environmental contaminants.

1. Sewage effluents
2. Leachates from landfill sites
3. Effluents from specific major industries such as, chemical industries and foundries
4. Raw and finished drinking water.

An individual will be hired to collate the information, organize it for easy reference and prepare detailed summary reports on each subject.

DURATION OF PROJECT: 2 YEARS *PRESENT YEAR IS:* 1st YEAR *REPORTING DATE:* 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$8,500	$8,500	None	None

SOURCE OF FUNDS: Provincial Lottery Trust Funds

REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS: Provincial Lottery Project No. 81-059-11

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY WMAB-1

BRANCH: WASTE MANAGEMENT ADVISORY BOARD DATE: SEPT. 30, 1982

PROJECT TITLE:
ECONOMIC BENEFITS OF MATERIALS RECYCLING

KEY WORDS: RECYCLING, ECONOMIC BENEFITS OF RECYCLING, PLANNING FOR RECYCLING

INVESTIGATOR AND AFFILIATION: M. K. BERKOWITZ AND ASSOCIATES LTD.

LIAISON OFFICER OR SUPERVISOR: J. WENDY COOK

RESEARCH CATEGORY: INTERNAL —— GRANT —— UNSOLICITED CONTRACT X SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:
TO DEVELOP A SYSTEM FOR DETERMINING THE ECONOMIC BENEFITS OF INCREASED MATERIAL RECYCLING ARISING FROM SOURCE SEPARATION IN TERMS OF JOBS OR BUSINESS CREATION, INCREASED G.N.P. AND RESOURCE SAVINGS IN DIFFERENT ONTARIO REGIONS.

DESCRIPTION:
A COMPUTER MODEL IS BEING DEVELOPED FOR INPUTS OF WASTE MATERIALS AVAILABLE FROM 57 DIFFERENT ONTARIO AREAS FOR ANALYSIS OF THE OUTPUTS IN TERMS OF THE GOODS THAT CAN BE PRODUCED AND FOR SPECIFIC LOCATIONAL FACTORS AND TRANSPORTATION COSTS. THE MODEL WILL ALLOW FOR AN ANALYSIS OF THE TRADE-OFFS OF LOCATING A NEW RECYCLING INDUSTRY IN AN ONTARIO AREA IN TERMS OF PROFIT AND LOSS, EMPLOYMENT AND OTHER FACTORS.

DURATION OF PROJECT: One YEARS PRESENT YEAR IS Final YEAR REPORTING DATE: November 1982

BUDGET:

TOTAL DOLLARS		MAN Days	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
$14,980	$14,980	53	53

SOURCE OF FUNDS: REGULAR WORK PROGRAM X SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY — WMAB-2

BRANCH: WASTE MANAGEMENT ADVISORY BOARD

DATE: SEPT. 30, 1982

PROJECT TITLE: PUBLIC INVOLVEMENT IN ENVIRONMENTAL PLANNING, ASSESSMENT AND DECISION-MAKING

KEY WORDS: PUBLIC CONSULTATION, PUBLIC PARTICIPATION, GOVERNMENT DECISION-MAKING

INVESTIGATOR AND AFFILIATION: FUTUREPLAN CONSULTING SERVICES

LIAISON OFFICER OR SUPERVISOR: J. WENDY COOK

RESEARCH CATEGORY: INTERNAL —— GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT X MULTI-YEAR PROJECT - - CONCURRENT PROJECT - -

OBJECTIVE:

TO IDENTIFY STRUCTURES AND MECHANISMS FOR INCREASED PUBLIC PARTICIPATION IN ONTARIO AND TO DESCRIBE ALTERNATIVE SYSTEMS IN USE IN CANADA, PLACING EACH WITHIN THE OVERALL FRAMEWORK OF THE ONTARIO MINISTRY OF THE ENVIRONMENT.

DESCRIPTION:

LEGISLATION AND VARIOUS STRUCTURES AND MECHANISMS FOR PUBLIC CONSULTATION AND PARTICIPATION IN GOVERNMENT DECISION-MAKING EXISTING IN OTHER PROVINCES WILL BE REVIEWED. THIS WILL INCLUDE PUBLIC ACCESS TO THE ENVIRONMENTAL ASSESSMENT PROCESS AS WELL AS TO ENVIRONMENTAL PLANNING.

DURATION OF PROJECT: One quarter YEARS — PRESENT YEAR IS: Final YEAR — REPORTING DATE: Nov. 30, 1982

BUDGET:

	TOTAL DOLLARS		MAN ~~YEARS~~ Days	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$7,673	$7,673	106	106

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY — WMAB-3

BRANCH: WASTE MANAGEMENT ADVISORY BOARD — DATE: Sept. 28, 1982

PROJECT TITLE: "A STUDY TO DETERMINE THE PROTECTION BY VARIOUS PACKAGING MATERIALS WITH RESPECT TO THE DELETERIOUS EFFECT OF LIGHT ON MILK."

KEY WORDS: PHOTODEGRADATION, MILK PACKAGING, FLUORESCENT LIGHT, VITAMIN LOSS

INVESTIGATOR AND AFFILIATION: DIVERSIFIED RESEARCH LABORATORIES LTD.

LIAISON OFFICER OR SUPERVISOR: GILES ENDICOTT, RESEARCH ASSOCIATE, W.M.A.B.

RESEARCH CATEGORY: INTERNAL —— GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT X — MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:

TO DETERMINE THE EFFECTS OF FLUORESCENT LIGHT ON VITAMINS AND FLAVOUR IN MILK, USING VARIOUS REFILLABLE AND THROWAWAY PACKAGING TYPES, UNDER SIMULATED RETAIL STORE CONDITIONS.

DESCRIPTION:

1. SURVEY OF TYPE OF FLUORESCENT LAMPS AND THEIR INTENSITY IN RETAIL CONDITIONS.

2. STUDY UNDER CONTROLLED CONDITIONS OF CONTAINER PERFORMANCE UNDER DIFFERENT TYPES OF LAMPS WITH DIFFERENT SPECTRAL CHARACTERISTICS.

3. STUDY TO DETERMINE VITAMIN A AND B_2 LOSS AND FLAVOUR CHANGE UNDER SIMULATED STORE CONDITIONS.

FINDINGS: UP TO 78% OF VITAMIN A, 30% LOSS OF VITAMIN B_2 AND SIGNIFICANT FLAVOUR LOSSES IN EXISTING CONTAINERS UNDER SIMULATED STORE CONDITIONS. OPAQUE AND COLOURED CONTAINERS WERE EFFECTIVE IN REDUCING PHOTODEGRADATION.

DURATION OF PROJECT: One YEARS — PRESENT YEAR IS —— YEAR — REPORTING DATE: Released August 1982

BUDGET: $54,732 of which W.M.A.B. $15,000 — TOTAL DOLLARS: TOTAL PROJECT / CURRENT YEAR 0 — MAN YEARS: TOTAL PROJECT / CURRENT YEAR 0

SOURCE OF FUNDS: REGULAR WORK PROGRAM —— SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT X — OTHER ——

IS A REPORT ANTICIPATED? Released Aug. 1982. Available from W.M.A.B.

PARTICIPATION BY OTHER MINISTRIES: Agriculture and Food, Health

REMARKS: STUDY COMPLETED OCTOBER 1980 UNDER AEGIS OF INDUSTRY TASK FORCE ON FLUID MILK PACKAGING, BUT NOT RELEASED UNTIL AUGUST 1982.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY WMAB-4

BRANCH: WASTE MANAGEMENT ADVISORY BOARD DATE: Sept. 28, 1982

PROJECT TITLE: DEVELOPMENT AND DEMONSTRATION OF AN EFFECTIVE WASTE REDUCTION PROGRAM

KEY WORDS: REDUCTION, SOLID WASTE

INVESTIGATOR AND AFFILIATION: RESOURCE INTEGRATION SYSTEMS AND MARKET FACTS LTD.

LIAISON OFFICER OR SUPERVISOR: GILES ENDICOTT, RESEARCH ASSOCIATE

RESEARCH CATEGORY: INTERNAL X — UNSOLICITED CONTRACT X — MULTI-YEAR PROJECT —
GRANT — SOLICITED CONTRACT — CONCURRENT PROJECT —

OBJECTIVE:

TO DEVELOP AND TEST PRACTICAL MECHANISMS BY WHICH CONSUMERS CAN ACHIEVE A REDUCTION IN WASTE GENERATION AND TO MEASURE THEIR EFFECTIVENESS.

DESCRIPTION:

THIS PROJECT WAS PIGGY-BACKED ON TO AN EXISTING RESIDENTIAL SOURCE SEPARATION SCHEME IN KITCHENER, ONTARIO. A DEMONSTRATION AND CONTROL AREA WERE SELECTED AND ALTERNATIVE STRATEGIES FOR PERSUADING CITIZENS TO CHANGE THEIR HABITS WERE ASSESSED. THE EFFECTIVENESS OF PERSUASION WAS CHECKED BY PHYSICAL SAMPLING OF GARBAGE AND BY VERBAL SURVEY BEFORE AND AFTER.

DURATION OF PROJECT: One YEARS — PRESENT YEAR IS One YEAR — REPORTING DATE Fall 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	43,400	43,400		

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Yes, fall 1982.

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

MOE 1293 6 78

Ministry of the Environment
Ontario

WM-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management *DATE:* June 1, 1982

PROJECT TITLE:
Foliar and Soil analysis of potting soils amended with compost from the E.R.R.P. (Follow-up to the completed study "Compost as a media amendment for Container Production".

KEY WORDS: Compost, Containers, Foliar Analysis

PRINCIPAL INVESTIGATOR AND AFFILIATION Associate Professor, G.P. Lumis - Horticultural Science, U. of Guelph

LIAISON OFFICER OR SUPERVISOR P.J. Provias

RESEARCH CATEGORY:
INTERNAL — *GRANT* —
UNSOLICITED CONTRACT X *SOLICITED CONTRACT* —
MULTI-YEAR PROJECT — *CONCURRENT PROJECT* —

OBJECTIVE:
The report (March 1981) of "Compost as a Media Amendment for Container Production" indicated some specific problems related to the composition of the E.R.R.P. compost and the growth of the plants appeared to be inhibited by certain contaminants (boron).

DESCRIPTION:
Additional work was required to clarify this situation. Plants were to be grown again in containers using mixes of Compost and regular potting soils. This work to be done in the green houses at the University of Guelph and the analysis (foliar and soil), was to be done by the Laboratory.

DURATION OF PROJECT 1 YEARS *PRESENT YEAR IS* 1st YEAR *REPORTING DATE* Fall 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	800	800	0.25	0.25

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

WM-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management *DATE:* August 7, 1981

PROJECT TITLE:
Survey of Conventionally non-reputable high grade waste paper fibre in relation to availability, economics of reclamation, energy requirements.

KEY WORDS:
Waste Paper, High grade fibres, dry defiberization of non-recycable fibres.

PRINCIPAL INVESTIGATOR AND AFFILIATION Dr. Geza Mataloczy, Ontario Research Foundation

LIAISON OFFICER OR SUPERVISOR P.J. Provias

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT X *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

OBJECTIVE: Ontario Research have patented a process to dry defiberize high grade waste paper which currently are considered non-recycable (coated, wax, wallpapers, magazine stock). Fibres become available for recycling after the low energy process (a disc refining process). Ontario Research is to study the availability of this type of waste at mill level, consumer level and converter level and assess the potential of the process to a recycling process and establish a potential pilot plant site.

DESCRIPTION:
Papers to which polymers have been added either as wet strengthening agents, water repellents or as coating adhesives, are very costly and impossible to recover with current technology. Grades of paper are poster papers, strippable wallpapers, milk carton stock, release coated papers. The fibre content of these materials is usually highly bleached chemical pulps. ORF patent covers a process for the recovery of fibre from these polymers containing waste papers. ORF is to determine the potential availability of this type of paper waste.

DURATION OF PROJECT 1 —— *YEARS* *PRESENT YEAR IS* 2nd —— *YEAR* *REPORTING DATE* Fall 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	8,000	3,500	0.25	0.10

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? Yes. Report delayed because of problems getting information from paper mills not anticipated by ORF. Draft report received June 1982. Final report expected by Dec 1982

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

WM-3

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management

DATE: June 1982

PROJECT TITLE:
Compost - An Evaluation of its use in Container Growing and Field Production for Landscape Trees and Shrubs.

KEY WORDS:
Compost, Containers, Landscaping Trees, Shrubs.

PRINCIPAL INVESTIGATOR AND AFFILIATION

LIAISON OFFICER OR SUPERVISOR Associate Professor G.P. Lumis - Horticultural Science - University of Guelph in conjunction with Sheridan Nurseries and T.C.G. Materials Limited.

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT X *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

OBJECTIVE:
1. To determine the suitability of the compost as an organic amendment for container and field grown coniferous and deciduores species.

2. To assess potential soluble salts and elemental toxicity and high PH problems in container mixes and field soils and to recommend solutions if any problems exist.

DESCRIPTION:
Sheridan Nurseries and T.C.G. Materials Limited (Brantford) are conducting the actual work in the fields, while the University of Guelph will conduct some greenhouse work on container growing. One field nursery site in Georgetown has been selected. Sheridan will supply trees, shrubs, and evergreens for the test work. Compost will be incorported into the soil at increasing rates in large plots in a blocked design. Manure application will be the comparison treatment.

At two (2) gravel pit sites owned by T.C.G. Materials Limited (Aberfoyle and Brantford), compost will be used as a mulch and soil additive for planting trees. Observations and measurements such as survival, initial bud break, shoot growth, leaf size, nutrients, root growth and over-winter survival will be taken for two (2) years at all sites; all monitoring will be conducted through the University of Guelph.

DURATION OF PROJECT 2 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE* Fall 1982 ~~Spring 1983 (Final~~

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	27,078	13,068	1.0	0.50

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

WM-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management *DATE:* May 1982

PROJECT TITLE: Compost Utilization

KEY WORDS: Compost, Sewage Sludge, Municipal Solid Waste

PRINCIPAL INVESTIGATOR AND AFFILIATION: Dr. C.S. Baldwin, Head Soils Section, Ridgetown College of Agricultural Technology.

LIAISON OFFICER OR SUPERVISOR: N.R. Ahlberg and P.J. Provias

RESEARCH CATEGORY:
INTERNAL —— *GRANT* X
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT —— *CONCURRENT PROJECT* ——

OBJECTIVE: To determine that compost derived from sewage sludge and municipal solid waste can be utilized on agricultural lands without incurring a build-up beyond tolerable levels of such contaminants as heavy metals and pathogens. Compost on test from the ERRP (organic MSW compost) will be used in a so-called "Fresh" (uncured) condition as well as a cured condition to compare growing rates and determine reasons for the structured growth on the ERRP compost during the first year.

DESCRIPTION: The utilization demonstration will be conducted by the Ridgetown College of Agricultural Technology on suitable sites prepared by the soils department of the College under the direction of Dr. Baldwin. A total of twenty-seven (27) plots (20' x 12') will be tested to establish the effect of the stability of compost on plant growth. Data will be obtained this year from plots also used last year to determine whether adverse effects noted in some trials recur during the second growth year.

DURATION OF PROJECT: 2 YEARS *PRESENT YEAR IS:* 2nd YEAR *REPORTING DATE:* Spring 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	81,500	32,500	3	1.5

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING ——
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

Ministry of Agriculture and Food

REMARKS: This work is actually a continuation of the project (WM-3) August 1980, the first year of growth studies being conducted during 1981. Current project is for one year only and is designed as a follow-up of the initial project but utilizing several grades of organic compost from the ERRP (uncured and cured) and comparing the growing rates with previous years as well as with the tests on the plots using the City of Windsor Compost.

Ministry of the Environment
Ontario

WM-5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management *DATE:* July 5, 1982

PROJECT TITLE: North York Source Separation Feasibility Study

KEY WORDS: Collection, Glass, Recycling

PRINCIPAL INVESTIGATOR AND AFFILIATION Municipality of North York

LIAISON OFFICER OR SUPERVISOR Adam Ciulini

RESEARCH CATEGORY: *INTERNAL* ___ *GRANT* X *UNSOLICITED CONTRACT* ___ *SOLICITED CONTRACT* ___ *MULTI-YEAR PROJECT* ___ *CONCURRENT PROJECT* ___

OBJECTIVE:
To determine the feasibility of collecting glass separately from a residential area for the purposes of recycling.

DESCRIPTION:
A pilot project will be implemented in a small residential area over a ten (10) week period. Collection will be by two (2) man crew and separate pickup truck. Quantities recovered and all associated costs will be monitored. The municipality will use this information in assessing a system serving the entire city.

DURATION OF PROJECT 10 weeks *YEARS* *PRESENT YEAR IS* ___ *YEAR* *REPORTING DATE* Project to be run in Fall 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	11,000	11,000		

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X *SPECIAL MINISTRY FUNDING* ___ *JOINTLY FUNDED PROJECT* X 50% by MOE. *OTHER* ___

IS A REPORT ANTICIPATED? Yes. As a part of a feasibility proposal.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Successful pilot project results may initiate a larger scale program funded by the Ministry's Source Separation Grant Program.

Ministry of the Environment
Ontario

WM-6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Waste Management *DATE:* July 6,1982

PROJECT TITLE:

Experimental Plant for Resource Recovery

KEY WORDS: Resource Recovery, Waste Management, shredding, refuse derived fuel, ferrous

PRINCIPAL INVESTIGATOR AND AFFILIATION N.R. Ahlberg, Waste Management Branch, Ministry of the Environment

LIAISON OFFICER OR SUPERVISOR N.R. Ahlberg

RESEARCH CATEGORY: *INTERNAL* X — *GRANT* — *UNSOLICITED CONTRACT* — *SOLICITED CONTRACT* — *MULTI-YEAR PROJECT* — *CONCURRENT PROJECT* —

OBJECTIVE:

1. To develop and evaluate processes and equipment for resource recovery.
2. To develop criteria for design and for estimating capital and operating costs.
3. To provide a regular supply of recovered materials for product utilization and market development.

DESCRIPTION:

The Experimental Plant for Resource Recovery processes 200 tonnes per day of solid waste through processes including shredding, air classification, screening, incineration and composting to recover materials for utilization within existing industry. Plant products include corrugated cardboard, refuse derived fuel, ferrous metal and compost. Products are either sold to industry or provided for market development projects.

DURATION OF PROJECT ——— *YEARS* *PRESENT YEAR IS* 6th *YEAR* *REPORTING DATE* ———

BUDGET: 15,000,000 Capital Cost

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR* 2,000,000	*TOTAL PROJECT* Est. 60	*CURRENT YEAR* 4

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* — *JOINTLY FUNDED PROJECT* — *OTHER* —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Regular reports issued on overall plant operations, reports on specific plant processes issued on an intermittent basis.

Ministry of the Environment
Ontario

WM-7

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT

DATE: JUNE 23, 1982

PROJECT TITLE:
BEST PIPE

KEY WORDS: gas, migration, energy, production, control

PRINCIPAL INVESTIGATOR AND AFFILIATION: Conestoga Rovers

LIAISON OFFICER AND SUPERVISOR: J. Petoia

RESEARCH CATEGORY: INTERNAL — GRANT — UNSOLICITED CONTRACT X SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE:
To assess the landfill gas energy extraction system as a control mechanism.

DESCRIPTION:
A gas extraction system to be installed to use gas at Kitchener Landfill Site in boilers at Best Pipe. The system will also serve as a control/migration sytem to nearby houses. Probes will be installed to monitor effectiveness.

DURATION OF PROJECT: 1 YEARS — PRESENT YEAR IS 1 YEAR — REPORTING DATE: FY/1983

BUDGET:	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	14,000 +			

SOURCE OF FUNDS: REGULAR WORK PROGRAM — SPECIAL MINISTRY FUNDING X — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED?
YES

PARTICIPATION BY OTHER MINISTRIES:
ENERGY, ENVIRONMENT CANADA

REMARKS:

MOE 1293 6/78

Ministry of the Environment

WM-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT DATE: JUNE 23, 1982

PROJECT TITLE:

GAS MIGRATION STUDY

KEY WORDS: gas, migration, methane, production

PRINCIPAL INVESTIGATOR AND AFFILIATION: Hydrology Consultants Limited

LIAISON OFFICER AND SUPERVISOR: J. Petoia

RESEARCH DELIVERY: INTERNAL —— GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT X MULTI-YEAR PROJECT X CONCURRENT PROJECT ——

OBJECTIVE:

To obtain sufficient data on gas production/migration in order to provide regions with guidelines re the use of land on or near closed landfilled areas.

DESCRIPTION:

Study of 9 production/migration sites; 3 inert sites; 5 control sites. Will ascertain best system under certain conditions. Temperature, pressure, concentration, probes installed at key monitoring locations to obtain data.

Study also to do complete state of the art and prepare library.

DURATION OF PROJECT: 3+ YEARS PRESENT YEAR IS 3+ YEAR REPORTING DATE JULY 82

BUDGET: $287.500.00

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$252,279.12	$26,220.88	None from MOE	

SOURCE OF FUNDS: REGULAR WORK PROGRAM —— SPECIAL MINISTRY FUNDING X JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: No

ENVIRONMENT CANADA, U.S. EPA

REMARKS:

This project was funded in FY 80/81 and FY 81/82 by the Provincial Lottery Trust Fund as Project No. 78-023-13 and funded in FY 82/83 by the Waste Management Branch. See Page PL-2.

Ministry of the Environment
Ontario

WM-9

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT

DATE: JUNE 24, 1982

PROJECT TITLE: REMOTE SENSING TECHNIQUES AND WASTE MANAGEMENT ASSESSMENT STUDY

KEY WORDS: remote sensing, waste disposal site

PRINCIPAL INVESTIGATOR AND AFFILIATION: M.M. Dillon Limited

LIAISON OFFICER OR SUPERVISOR: Leslie A. Ficzere, P. Eng.

RESEARCH CATEGORY: INTERNAL ___ GRANT ___ UNSOLICITED CONTRACT ___ SOLICITED CONTRACT X MULTI-YEAR PROJECT ___ CONCURRENT PROJECT ___

OBJECTIVE: The objective of the study is to develop remote sensing techniques such as infrared, true colour, and thermal imagery in order to assist in idenfitying areas, previously landfilled and to identify environmental impacts arising from existing and former landfills due to leachate and gas production and migration.

DESCRIPTION:

An engineering applied research study is commissioned to determine the use of present remote sensing techniques

DURATION OF PROJECT: 1 YEARS

PRESENT YEAR IS: 1 YEAR

REPORTING DATE: July 31, 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	$88,100.00			

SOURCE OF FUNDS: REGULAR WORK PROGRAM X ___ SPECIAL MINISTRY FUNDING ___ JOINTLY FUNDED PROJECT ___ OTHER ___

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: N/A

REMARKS:

Ministry of the Environment

MM-10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: WASTE MANAGEMENT DATE: JUNE 23, 1982

PROJECT TITLE:

STUDY ON LANDFILL RESEARCH ACTIVITIES

KEY WORDS: co-disposal, hazardous, waste, municipal

PRINCIPAL INVESTIGATOR AND AFFILIATION: Golder Associates, University of Waterloo

LIAISON OFFICER AND SUPERVISOR: J. Petoia

RESEARCH AGENCY: INTERNAL — GRANT — UNSOLICITED CONTRACT X SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE:

To identify past and on-going research activities associated with the release of contaminants resulting from the disposal of waste into landfill.

DESCRIPTION:

Conduct a comprehensive survey of document and assess all relevant past and on-going research activities related to the release of contaminants.

1. Examine various waste classifications.
2. Processes affecting the decomposition of the wastes and production of leachate or gas.
3. Migration of contaminants and their attenuation.
4. Control of production and migration of contaminants.

DURATION OF PROJECT: 1 YEARS PRESENT YEAR IS 1 YEAR REPORTING DATE

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
ESTIMATE:	$15,000.00			

SOURCE OF FUNDS: REGULAR WORK PROGRAM — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT X OTHER —

IS A REPORT ANTICIPATED? YES

PARTICIPATION BY OTHER MINISTRIES: ENVIRONMENT CANADA

REMARKS:

MOE 1294 6-76

Ministry of the Environment
Ontario

WR-1

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology & Monitoring

DATE: July 10, 1982

PROJECT TITLE:
Hydrogeologic Mapping

KEY WORDS: Ground Water; Probability; Susceptibility; Hydrogeology

INVESTIGATOR AND AFFILIATION: K. T. Wang

LIAISON OFFICER OR SUPERVISOR: R. C. Ostry, Head, Technical Support Unit

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT X — CONCURRENT PROJECT —

OBJECTIVE:

To determine ground-water yields and the susceptibility of ground water to contamination.

DESCRIPTION:

The project involves mapping of ground-water resources and the susceptibility of these resources to contamination in the Province. The maps are intended to provide basic ground-water data and interpretations on the availability of ground water in order to assess water-supply potentials for various uses, and to determine the general susceptibility of these resources to contamination from common sources of pollution.

DURATION OF PROJECT: ongoing YEARS — PRESENT YEAR IS 15 YEAR — REPORTING DATE 12 months

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		44,000		2

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Yes, part of "Water Resources Map" Series

PARTICIPATION BY OTHER MINISTRIES: Nil

REMARKS: To date, nine county areas have been covered by the probability mapping series. Simcoe County (North Portion) and Grey County will be published in 82/83. Work has been completed for Durham Region and Huron County, and is progressing for Bruce County. The susceptibility of ground water to contamination series includes the Windsor-Essex and St. Thomas map sheets which have been published and the following map sheets which will be published or are nearing completion in 82/83: Goderich, Seaforth, Strathroy. Bothwell, Tillsonburg, Galt, Newmarket, Ottawa, Thunder Bay, Copper Cliff.

MOE 1293 6/78

Ministry of the Environment
Ontario

WR-2

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology & Monitoring DATE: July 10, 1982.

PROJECT TITLE: Evaluation of the Long Term Impact of Pollutants in Ground Water

KEY WORDS: Ground-Water Contamination; Subsurface Contaminants

INVESTIGATOR AND AFFILIATION: Dr. G. Hughes, Chief, Ground-Water Protection Unit.

LIAISON OFFICER OR SUPERVISOR: as above

RESEARCH CATEGORY: INTERNAL X GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT X CONCURRENT PROJECT —

OBJECTIVE:

To examine the long-term impacts of contaminants in ground-water flow systems in order to allow for the development of Ministry policies relating to the prevention and clean up of leaks, spills, etc., in hydrogeologically sensitive areas.

DESCRIPTION:

At the present time it is often difficult to quantify the impact of leaks and spills of refined hydrocarbons, the presence of unprotected sand/salt storage facilities, and the occurrence of accidental spills of chemicals, etc., on areal ground-water conditions because of the nature and speed of contaminant movement in the subsurface and the complexities of local hydrogeology. In order to have meaningful policies and guidelines adopted to control the above-mentioned contaminating factors, it is necessary to promote an understanding of the long-term potential of the problem through careful documentation.

DURATION OF PROJECT: Continuing YEARS PRESENT YEAR IS 9 YEAR REPORTING DATE: Periodic

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		98,000		3 1/2

SOURCE OF FUNDS: REGULAR WORK PROGRAM X SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Reports are prepared on various projects, project aspects & case histories as work progresses.

PARTICIPATION BY OTHER MINISTRIES:
Involved on MTC Contamination Committee and in liaison with Consumer and Commercial Relations and most hydrogeological consultants.

REMARKS:

MM 1293 5/75

Ministry of the Environment

Ontario

RESEARCH AND DEVELOPMENT INVENTORY

WR-3

BRANCH: Water Resources - Hydrology & Monitoring

DATE: July 10, 1982

PROJECT TITLE:
Ground Water Quality in Ontario

KEY WORDS: Ground Water; Network; Water Quality

INVESTIGATOR AND AFFILIATION: Doug Vallery, Geologist

LIAISON OFFICER OR SUPERVISOR: Dave Terry, Chief, Networks

RESEARCH CATEGORY:
INTERNAL X — GRANT —
UNSOLICITED CONTRACT — SOLICITED CONTRACT —
MULTI-YEAR PROJECT X — CONCURRENT PROJECT —

OBJECTIVE:

To develop and interpret a ground-water quality data base for the various hydrogeologic regions in Ontario.

DESCRIPTION:

Establishing a network of monitoring wells, and/or employing historic data:

1. to establish natural, background (INDEX) ground-water quality conditions and to determine changes or trends in this water quality over the long term;
2. to monitor ground-water quality in the major municipal (WATER-SUPPLY) aquifers of the Province in order to determine the continued suitability of water supplies or the nature of changes or trends in the quality of the supplies;
3. to accommodate special studies as required by Ministry objectives of ensuring the suitability of ground-water supplies for intended uses; the definition of these objectives and their review will be a routine network task.

DURATION OF PROJECT: On-going ——— YEARS

PRESENT YEAR IS: 1 ——— YEAR

REPORTING DATE: mid-1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		18,000		1/2

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING —
JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Annual

PARTICIPATION BY OTHER MINISTRIES:

Nil

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

WR-4

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology & Monitoring DATE: July 10, 1982

PROJECT TITLE:
APIOS Ground-Water Studies

KEY WORDS: Ground water; Acidification; APIOS

INVESTIGATOR AND AFFILIATION: Joe Lye, APIOS

LIAISON OFFICER OR SUPERVISOR: U. Sibul, Head Resource Assessment Group

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE:

To determine ground-water quality in the APIOS program in northern and central Ontario and to assess the contribution of ground water in the Ministry's calibrated watersheds in the Muskoka-Haliburton area.

DESCRIPTION:

Two separate phases of work are being undertaken:

1. To conduct an inventory of ground-water quality, especially its acidity, in preselected areas on the Canadian Shield in northern and central Ontario, and

2. To determine the impact that ground water has on stream and lake-water quality in the Ministry's calibrated watersheds; part of this work will involve research-related activity into the natural processes that determine ground-water quality in the Shield area.

DURATION OF PROJECT: On-going ——— YEARS PRESENT YEAR IS 2 ——— YEAR REPORTING DATE: Annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		135,000		2½

SOURCE OF FUNDS: REGULAR WORK PROGRAM — X — SPECIAL MINISTRY FUNDING X — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED?
Annual summary reports; see remarks.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Reports: APIOS 001/82 A Synoptic Survey of the Acidification of Ground Waters in the Muskoka-Haliburton Area of Ontario, 1980

APIOS 002/82 A Synoptic Survey of the Acidification of Ground Waters in the Sudbury Area of Ontario, 1981

MOE 1293 6/76

Ministry of the Environment
Ontario

WR-5

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources, Hydrology & Monitoring Section DATE: July 13, 1982

PROJECT TITLE:
Field Measurement of Infiltration Through Landfill Covers

KEY WORDS: Ground-water Infiltration; Landfill Covers

INVESTIGATOR AND AFFILIATION: P.K. Lee
Gartner Lee Associates Ltd.

LIAISON OFFICER OR SUPERVISOR: Dr. G. M. Hughes, Chief
Ground Water Protection Unit

RESEARCH CATEGORY: External X — INTERNAL — — GRANT —
UNSOLICITED CONTRACT — — SOLICITED CONTRACT X
MULTI-YEAR PROJECT X — CONCURRENT PROJECT —

OBJECTIVE:
To collect field measurements of the actual amount of water which infiltrates through various types of covers under various conditions at landfill sites. The data collected will be tested for reproducibility and compared to the results expected using the empirical calculations of infiltration.

DESCRIPTION:
Through a program of close liaison with the MOE and other regulatory and research bodies, 3 prototype lysimeter systems will be designed and constructed. These systems will be monitored for 12 months and the data analysed and checked for consistency. Additional lysimeter systems incorporating various cover materials and physical settings will then be constructed and monitored. A complete analysis and assessment of the results will be undertaken.

DURATION OF PROJECT: 2 YEARS
PRESENT YEAR IS: 1st YEAR
REPORTING DATE: March 31, 1984

BUDGET:

TOTAL DOLLARS		MAN YEARS from MOE	
TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
$29,700	$29,700	None	None

SOURCE OF FUNDS: REGULAR WORK PROGRAM — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER X

IS A REPORT ANTICIPATED? Yes. Interim and final

PARTICIPATION BY OTHER MINISTRIES:
NIL

REMARKS:
Provincial Lottery Project 82-058-12

See Page PL-19.

Ministry of the Environment

WR-6

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology & Monitoring DATE: July 10, 1982

PROJECT TITLE: Application of Geophysical Techniques to Ground-Water Studies

KEY WORDS: Ground-Water Exploration; Ground-Water Contamination; Geophysics; Remote Sensing; Seismic Exploration; Electrical Resistivity

INVESTIGATOR AND AFFILIATION: Dr. E. Rodrigues, Chief, Geotechnical Services Unit

LIAISON OFFICER OR SUPERVISOR: as above

RESEARCH CATEGORY: INTERNAL X GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT X CONCURRENT PROJECT —

OBJECTIVE:

To enhance the application of geophysical techniques to ground-water supply and contamination studies in order to develop geophysics as an inexpensive method of subsurface hydrogeologic investigations.

DESCRIPTION:

As labour costs escalate, making the installation of observation wells and carrying out test drilling for ground-water exploration and contamination studies more costly, the use of geophysical techniques for subsurface investigations is being increased. It is anticipated that existing geophysical techniques can be developed to aid in the tracing of contaminant plumes and defining soil attenuating capacities. This work is part of the continuing service function of the Geotechnical Services Unit.

DURATION OF PROJECT: Continuing YEARS PRESENT YEAR IS 9 YEAR REPORTING DATE: Ongoing

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		67,000		2

SOURCE OF FUNDS: REGULAR WORK PROGRAM X SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Reports are prepared on various projects and aspects as work progresses.

PARTICIPATION BY OTHER MINISTRIES:

Nil

REMARKS:

Service function primarily to Regional Staff; however, requests for assistance from MTC, DOE and universities are answered.

MOE 1293 6/76

Ministry of the Environment
Ontario

WR-7

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology & Monitoring DATE: July 10, 1982.

PROJECT TITLE:
Drainage Basin Inventory Studies

KEY WORDS: Basins; Water Resources Inventory; Water Management; Land Use Planning

INVESTIGATOR AND AFFILIATION: V. Chin, J. Miller, M. Turner, Water Quantity Unit

LIAISON OFFICER OR SUPERVISOR: U. Sibul, Head, Resource Assessment Group

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT X — CONCURRENT PROJECT —

OBJECTIVE:

To determine the inventory of surface and ground-water resources, both quantity and quality, in drainage basins in Ontario.

DESCRIPTION:

The basin inventories are designed to provide baseline water resources data and interpretation publications for future planning and water-resources management in Ontario. The studies are designed to ultimately cover all of the Province on the drainage basin scale. The project involves intensive surface and ground-water data gathering and analysis to determine integrated water resources in drainage basins. Major water uses and management alternatives are described.

DURATION OF PROJECT: On-going YEARS — PRESENT YEAR IS 19 YEAR — REPORTING DATE: ~~one every eighteen mths.~~ on an average of (see also remar

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		89,000		3

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Every 18 months (approx.) "Water Resources Report" series

PARTICIPATION BY OTHER MINISTRIES:
Nil

REMARKS:

Existing publications are for the following drainage basins; Big Otter Creek; Big Creek; Upper Nottawasaga River; Moira River; Duffins - Rouge; three reports for Northern Ontario; South Nation; Holland - Black; Humber-Don (in draft)

Ministry of the Environment
Ontario

WR-8

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources - Hydrology & Monitoring *DATE:*

PROJECT TITLE:
Surface-Water Quality Management (Water Quality Flagging)

KEY WORDS: Water Quality; Water Quality Criteria; Computer Programming

INVESTIGATOR AND AFFILIATION: J. E. O'Neill, Networks Unit

LIAISON OFFICER OR SUPERVISOR: R. D. Terry, Chief, Networks Unit

RESEARCH CATEGORY: *INTERNAL* X — *GRANT* — *UNSOLICITED CONTRACT* — — *SOLICITED CONTRACT* — — *MULTI-YEAR PROJECT* X — *CONCURRENT PROJECT* —

OBJECTIVE:

To operate a computer program that enables the examination and interpretive reporting of water quality of inland lakes and streams, and to continue to identify non-compliance problem areas.

DESCRIPTION:

With over 800 water quality stations in the Provincial network, it is difficult to provide water quality interpretations at all locations within a reasonable time. To this end, a computer program has been developed to provide the flexibility of comparing existing water quality either to provincial criteria or (in the absence of specific criteria) to user designated reference levels. The flagging procedure will report on the frequencies (i.e. percent of water quality samples) of violation of criteria for different water uses in a given period.

DURATION OF PROJECT: on-going ——— *YEARS* *PRESENT YEAR IS* —5— *YEAR* *REPORTING DATE* Annual

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$22,000		1/2

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* — — *JOINTLY FUNDED PROJECT* — — *OTHER* —

IS A REPORT ANTICIPATED?
See remarks-Two internal publications

PARTICIPATION BY OTHER MINISTRIES:
Nil

REMARKS:

1981 - Methodology Report - "Water Quality Flagging - Development of a Method for Determining Water Quality and Identifying Potential Problems"

1982 - First Inventory Report - "An Inventory of Noncompliance of Selected Water Quality Variables in Ontario"

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

WR-9

BRANCH: Water Resources

DATE: July 1982

PROJECT TITLE: ONTARIO EXPERIMENTAL NEUTRALIZATION STUDY

KEY WORDS: Neutralization, acidification

INVESTIGATOR AND AFFILIATION: P.J. Dillon

LIAISON OFFICER OR SUPERVISOR: T.G.Brydges

RESEARCH CATEGORY: INTERNAL —— GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT X CONCURRENT PROJECT ——

OBJECTIVE:

To determine if neutralization of lakes can be used to protect endangered aquatic ecosystems in acid stressed lakes and restore fish and other biota in highly acidic lakes.

DESCRIPTION:

1) Field studies in the Sudbury area are planned.
2) The neutralization programme is experimental.
3) Neutralization experiments are to be conducted for either of two purposes - renovation of acidic waters or maintenance of fish stocks in acid-stressed waters.

DURATION OF PROJECT: 5 YEARS

PRESENT YEAR IS: 2 YEAR

REPORTING DATE: ——

BUDGET: $700K

TOTAL DOLLARS: TOTAL PROJECT, CURRENT YEAR

MAN YEARS: TOTAL PROJECT, CURRENT YEAR

SOURCE OF FUNDS: REGULAR WORK PROGRAM ——; SPECIAL MINISTRY FUNDING X; JOINTLY FUNDED PROJECT ——; OTHER ——

IS A REPORT ANTICIPATED?

PARTICIPATION BY OTHER MINISTRIES:

Ministry of Natural Resources

REMARKS:

Ministry of the Environment
Ontario

WR-10

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: July 1982

PROJECT TITLE:

Acidic Precipitation in Ontario Study

KEY WORDS: Acidification, acidic precipitation, deposition, susceptibility

INVESTIGATOR AND AFFILIATION: P.J. Dillon, Limnology Unit

LIAISON OFFICER OR SUPERVISOR: T.G.Brydges

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT —— *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT X *CONCURRENT PROJECT* ——

OBJECTIVE:

To quantify the physical, chemical and biological effects of acidic inputs to lakes. To construct models enabling prediction of effects.

DESCRIPTION:

The intensive studies on the characterization of the effects of acidic inputs are being conducted on lakes in Muskoka-Haliburton. It involves a calibrated lake and watershed approcah over many years. Predictive models will be developed and tested on these lakes and applied to other lakes in the Province.

DURATION OF PROJECT —— *YEARS* *PRESENT YEAR IS* 4th *YEAR* *REPORTING DATE* ——

BUDGET:

TOTAL DOLLARS		MAN YEARS	
TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
$965,000			

SOURCE OF FUNDS:
REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING X
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

Ministry of Natural Resources

REMARKS:

Ministry of the Environment
Ontario

WR-11

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: November 9, 1982

PROJECT TITLE:

MARSHLAND PROJECTS

KEY WORDS:
Listowel, Artificial Wetlands, Sewage Treatment

PRINCIPLE INVESTIGATOR AND AFFILIATION: I. Wile, Limnology Section

LIAISON OFFICER OR SUPERVISOR: Dr. P.J. Dillon, Limnology Section

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT X — MULTI-YEAR PROJECT X — CONCURRENT PROJECT —

OBJECTIVE:
To determine the capability of natural and artificial wetlands to treat sewage on a year round basis. Specifically; 1) to establish loading rates, 2) define degree of pre-treatment 3) develop optimal design and operational criteria, and 4) assess long term impact of sewage on wetlands.

DESCRIPTION:
(see attached)

DURATION OF PROJECT: Phase 1-3 years; Phase 2-3 years YEARS

PRESENT YEAR IS: 1st Phase 2 YEAR

REPORTING DATE: see attached *

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
Phase 1	489,340	169,000	18	3

SOURCE OF FUNDS: REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER lottery

IS A REPORT ANTICIPATED? Yes (technical papers and MOE reports)

PARTICIPATION BY OTHER MINISTRIES:
Indirect participation through funding of peripheral projects i.e. methane production by Ministry of Energy and use of wetlands in northern Ont. by Ministry of Northern Affairs.

REMARKS:
(see attached)

Description

1) Listowel Artificial marsh sewage treatment facility:

Constructed in 1979/80 adjacent to the existant sewage treatment lagoons in Listowel. Commenced operations in August 1980. Consists of five separate marshes and has great operational flexibility (i.e. loading rates, pre-treatment of wastewater, liquid depth and detention times).

2) Bradford:

A small, fully instrumented natural marsh was monitored for two years to establish background nutrient fluxes. Sewage additions from the existant Bradford Sewage Treatment Plant were commenced in June 1981.

3) Long Term impact of Sewage Effluent on Wetlands:

Initiated in 1982 to define the long term capability of wetlands to renovate wastewater. Study consists of a review of potential study sites (wetlands which have received wastewater for 10 or more years), identification and detailed monitoring of 2-3 sites.

Remarks

PHASE 1 - funding provided for 3 year period (1979/80 - 1981/82) for Listowel artificial marsh (Lottery, southwestern region and Water Resources Branch) and Bradford natural marsh (Water Resources Branch).

Listowel -	Provincial Lottery Capital Costs	=	$284,340
	Provincial Lottery Labour costs	=	$ 51,000
	Southwestern Region	=	$ 69,000
	Water Resources Branch	=	$ 85,000
			$489,340
Bradford -	Water Resources Branch	=	$145,000

PHASE 2 - Due to unavoidable delays in starting the projects (construction time) and length of time required for marshes to normalize following sewage additions, projects were extended for an additional three years (1982/83 - 1984/85). In addition funding was provided for a study on the long term impact of wastewater on wetlands.

Funding for 1982/83 (excluding laboratory costs for Toronto and Southwestern Region laboratories).

Lottery	=	$ 19,100 (carry over of unspent labour costs)
Water Resources Branch	=	$171,000

*REPORTS PUBLISHED TO DATE

Jones, P.J. and I. Wile. 1980. Waste Water Treatment by Aquatic Macrophytes. In "New Developments in Wastewater Treatment", University of Toronto, Civil Engineering. 24-40.

Wile, I. 1980. An approach to Wastewater treatment on marsh and swamp land. In "New Developments in Wastewater Treatment", University of Toronto Civil Engineering. 41-51.

Wile, I., G. Palmateer and G. Miller. 1981. Use of artificial wetlands for wastewater treatment. In "Wetland Values and Management". 255-271.

Black, S.A., I. Wile and G. Miller. 1981. Sewage effluent treatment in an artificial marshland. W.P.C.F. Conf. Detroit, Michigan.

Wile, I.G., G. Miller and S. Black. 1982. Design and use of artificial wetlands. In "Wetland Treatment of Municipal Wastewater" (in press).

Ministry of the Environment
Ontario

WR-12

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources *DATE:* July 1982

PROJECT TITLE:
(1) Urban Lakes: (2) Lake Restoration

KEY WORDS: (1) Urban Lakes, stormwater impoundment; (2) Aeration, Destratification

INVESTIGATOR AND AFFILIATION G.Robinson, Limnology Section

LIAISON OFFICER OR SUPERVISOR Dr. T.G. Brydges

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* X — *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X — *CONCURRENT PROJECT* ——

OBJECTIVE:
(1) To examine urban stormwater impoundments, identify existing and potential problem areas, and recommend solutions.
(2) To improve water quality in small eutrophic lakes through the use of aeration and/or chemical inactivation techniques.

DESCRIPTION:
(1) Lakes Aquitane and Wabukayne - these two man-made lakes have been studied since they were constructed (1976-77).
- there are distinct differences in sedimentation basin designs and watershed areas.
-problem areas include: turbidity, road salt, Cladophora and floating debris.
(2) Heart Lake has been destratified through aeration since 1975.

DURATION OF PROJECT Ongoing *YEARS* *PRESENT YEAR IS* (1) 6th (2) 8th *YEAR* *REPORTING DATE* 1981

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
Regular Budget	(1)	18K		(1) 0.1
	(2)	12K		(2) 0.1

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* X — *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? (1) Published in proceedings of Int. Symp. on Inland Waters and Lake Restoration (1981) + Freshwat. Biol. 10: 553-61

PARTICIPATION BY OTHER MINISTRIES:
Heart Lake Conservation Authority (M.T.R.C.A.) assists with compressors.

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

WR-13

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources *DATE:* July 1982

PROJECT TITLE:
Phosphorus Removal Studies

KEY WORDS: Phosphoaur-removal, (1) Penetang-Midland (2) Bay of Quinte, (3) Gravenhurst

INVESTIGATOR AND AFFILIATION: G. Robinson, Limnology Section

LIAISON OFFICER OR SUPERVISOR: Dr. T.G. Brydges

RESEARCH CATEGORY:
INTERNAL X *GRANT* —
UNSOLICITED CONTRACT X *SOLICITED CONTRACT* —
MULTI-YEAR PROJECT X *CONCURRENT PROJECT* —

OBJECTIVE:
To examine existing conditions in several highly enriched water bodies and then study the effects of reduced phosphorus loading through P - control at local sewage treatment plants.

DESCRIPTION:
(1) Penetang-Midland and Sturgeon Bay
- 15 sites sampled bi-weekly from May to October.
- P-removal implemented at 4 S.T.P.'s in 1975, new plant to discharge to Sturgeon Bay in 1983.

(2) Bay of Quinte
- 6 sites sampled weekly from May to October
- P-removal implemented at 5 S.T.P.'s by 1977.

(3) Gravenhurst
- 1 site sampled bi-weekly from May to November.
- P-removal implemented at 1 S.T.P. in December 1971.
- Plant effluent and receiving stream also sampled.

DURATION OF PROJECT: Ongoing *YEARS* *PRESENT YEAR IS* (1) 11th (2) 11th (3) 14th *YEAR* *REPORTING DATE* (1) 1982 (2) 1982 (3) 1982

BUDGET:
TOTAL DOLLARS — *TOTAL PROJECT* — *CURRENT YEAR* (1) 18K (2) 16K (3) 5K
MAN YEARS — *TOTAL PROJECT* — *CURRENT YEAR* (1) 0.2 (2) 0.2 (3) 0.1

SOURCE OF FUNDS:
REGULAR WORK PROGRAM (3)
SPECIAL MINISTRY FUNDING (1)
JOINTLY FUNDED PROJECT (2)
OTHER —

IS A REPORT ANTICIPATED?
(1) Complete report. (2) Complete report. (3) Update since 1976

PARTICIPATION BY OTHER MINISTRIES:
(2) Co-operative project with Ministry of Natural Resources, Canada Centre for Inland Waters Queens University and University of Guelph.

REMARKS:
(1) Ministry of Natural Resources Participates in Sturgeon Bay Study.

Ministry of the Environment
Ontario

WR-14

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources *DATE:* July 1982

PROJECT TITLE:
Lower Holland River, Phosphorus Regeneration Study

KEY WORDS: Holland River, Phosphorus Regeneration

INVESTIGATOR AND AFFILIATION: K. Nicholls/G. Robinson - Limnology Section

LIAISON OFFICER OR SUPERVISOR: Dr. T.G. Brydges

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* X — *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* X

OBJECTIVE:
To determine the source of the large build-up of DRP and total P during mid-summer in the Lower Holland River, and explore possible remedial measures.

DESCRIPTION:
- two large enclosures (4m dia.) installed in river in late May.
- enclosures consist of clear vinyl cylinders (open at both ends).
- one enclosure is treated with rotenone.
- enclosures and adjacent river area are sampled weekly until October.
- 3 other stations are sampled bi-weekly.

DURATION OF PROJECT: 1 *YEARS* *PRESENT YEAR IS* 1st *YEAR* *REPORTING DATE:* 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		12K		0.2

SOURCE OF FUNDS:
REGULAR WORK PROGRAM —— *SPECIAL MINISTRY FUNDING* X — *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Report due in May 1983

PARTICIPATION BY OTHER MINISTRIES:
National Resources

REMARKS:

MOE 1293 8/76

Ministry of the Environment
Ontario

WR-15

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: July 1982

PROJECT TITLE:
Taxonomy and Ecology of Phytoplankton in Lake Acidification, Neutralization and Eutrophication Studies

KEY WORDS: Algae, Phytoplankton, Acidification, Eutrophication

INVESTIGATOR AND AFFILIATION: K.H. Nicholls, Limnology Section

LIAISON OFFICER OR SUPERVISOR: T.G. Brydges

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —
UNSOLICITED CONTRACT — — *SOLICITED CONTRACT* X
MULTI-YEAR PROJECT —
CONCURRENT PROJECT —

OBJECTIVE:
To describe structure and function of phytoplankton communities (taxonomy and ecology) relative to lake acidity and lake trophic state.

DESCRIPTION:

A. Muskoka-Haliburton
1) Study of several lakes relating composition and biomass of phytoplankton to other ecosystem variables (e.g. lake morphometry, water chemistry, food chain components).
2) Comparison of phytoplankton communities of selected lakes in 1979-80 with early records published by G.M. Smith (1920).
3) Taxonomy of diatom frustules and Mallomonas scales in selected lake sediments (along with ^{210}Pb dating) to determine rate of lake acidification during past three centuries.
4) Factors controlling growth and odour production by Chrysochromulina breviturrita

B. Great Lakes
1) Response of phytoplankton to P loading reductions and long term changes related to nutrient loading, hydrology and climate (Bay of Quinte, south Georgian Bay, nearshore Great Lakes).

DURATION OF PROJECT: ——— YEARS
PRESENT YEAR IS: 5 YEAR
REPORTING DATE: Significant findings reported as they arise.

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		120K		

SOURCE OF FUNDS:
REGULAR WORK PROGRAM X
SPECIAL MINISTRY FUNDING X
JOINTLY FUNDED PROJECT —
OTHER 1. APIOS 2. Great Lakes 3. Regular

IS A REPORT ANTICIPATED? Several available, more in progress.

PARTICIPATION BY OTHER MINISTRIES:
Ministry of Natural Resources, Dept. of Fisheries & Oceans, Queen's & Guelph Universities

REMARKS:

Ministry of the Environment
Ontario

WR-16

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources *DATE:* July 1982

PROJECT TITLE: FILAMENTOUS ALGAE PROGRAMME

KEY WORDS: Filamentous algae, Cladophora, monitor, nutrients, heavy metals, PCB's Acidification

INVESTIGATOR AND AFFILIATION: Michael B. Jackson, Limnology Section

LIAISON OFFICER OR SUPERVISOR: K.H. Nicholls, Limnology Section

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
(1) To determine the effects of acidification on the distribution and abundance of filamentous algae in Ontario inland lakes and streams.
(2) To assess phosphorus control strategies for the Great Lakes relative to Cladophora growth requirements.
(3) To apply Cladophora tissue analysis to biomonitor long term trends in nearshore trace contaminants (nutrients, heavy metals, PCB's) in the Great Lakes.

DESCRIPTION:
(1) Investigations of filamentous algae and controlling environmental factors, especially the role of pH in Ontario inland lakes and streams.
(2) Monitoring Cladophora growth and environmental parameters at a single site in Lake Ontario in conjunction with I.J.C. lake-wide limnological investigations.
(3) Surveillance of Cladophora heavy metal, PCB and nutrient levels in Lake Ontario and the Niagara River in cooperation with investigations by I.J.C. and other government agencies.

DURATION OF PROJECT: Ongoing *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE:* As information made available.

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR 75K services only	TOTAL PROJECT	CURRENT YEAR

SOURCE OF FUNDS:
REGULAR WORK PROGRAM —— *SPECIAL MINISTRY FUNDING* X *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Two available - others planned.

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

WR-17

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: July 1982

PROJECT TITLE: Algal assay methods to determine toxicity of natural water in ecosystems.

KEY WORDS: Toxicity, metals, organic compounds, algal assays.

INVESTIGATOR AND AFFILIATION: S.L. Wong, Plankton Taxonomy Unit

LIAISON OFFICER OR SUPERVISOR: K.H. Nicholls - Limnology Section

RESEARCH CATEGORY:
INTERNAL X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* X — *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:
To develop and apply assay techniques for evaluation of toxic effects of metals, organic contaminants and other growth inhibitary factors on aquatic biota.

DESCRIPTION:
Algal assay techniques were developed to determine toxicity of natural waters that are subject to stresses of organic and inorganic contaminants, in the presence of other factors, such as nutrients and pH.

DURATION OF PROJECT ——— *YEARS* — *PRESENT YEAR IS* 4 *YEAR* — *REPORTING DATE* As information generated.

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT (evaluated annually)	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
				1.0

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* —— *SPECIAL MINISTRY FUNDING* X — *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? The third report is now under review

PARTICIPATION BY OTHER MINISTRIES:

REMARKS:

Ministry of the Environment
Ontario

WR-18

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources Branch

DATE: July 1982

PROJECT TITLE: Lake Superior Pulp and Paper Effluent Characterization

KEY WORDS: mill effluents, characterization, toxic pollutants

INVESTIGATOR AND AFFILIATION: C. Cherwinsky, Investigation and Assessment Unit, Great Lakes Section

LIAISON OFFICER OR SUPERVISOR: M. Griffiths

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE: Characterize mill effluents impacting on Lake Superior in order to establish a data base of pulp and paper effluent constituents, especially with respect to toxic pollutants. This information will be used for selecting study areas for future investigations.

DESCRIPTION: Pulp and paper mill process wastes are known sources of conventional and toxic water pollutants. Various organic and inorganic contaminants responsible for fish tainting, taste and odour problems, toxicity or bioaccumulation in fish have been identified as constituents of pulp and paper mill effluents. A comprehensive characterization of effluents from Ontario mills should therefore be undertaken in order to establish an inventory of environmentally significant compounds and a data base against which future trend assessments can be determined.

Single composite effluent samples from 7 mills discharging either directly or indirectly into Lake Superior will be collected and analyzed for selected pesticides, organic and metal trace contaminants, bacteria and various other chemical and physical variables. Toxicity assays using fish will be conducted simultaneously on the effluent samples by the Toxicity Section. The mills to be examined are: Great Lakes Paper Co. Ltd., Abitibi Provincial and Abitibi Price Inc., Thunder Bay; Abitibi Price Inc., Fort William; Domtar Packaging, Red Rock; Kimberly Clark, Terrace Bay; and American Can Co. of Canada Ltd., Marathon.

DURATION OF PROJECT: 3 YEARS — *PRESENT YEAR IS:* 2 YEAR — *REPORTING DATE:* 1984

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$21,000		0.4

SOURCE OF FUNDS: 50/50 Provincial/Federal — REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT COA — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: An investigation of conventional and trace contaminant constituents in the Kimberly-Clark pulp mill effluent and the receiving waters of Jackfish Bay was undertaken in 1981/82. Data from the present study will be used in the formulation of pulp and paper effluent guidelines and issues of control orders, as well as priority setting for future Lake Superior water quality investigations.

MOE 1293 6/76

Ministry of the Environment
Ontario

WR-19

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources Branch

DATE: July 1982

PROJECT TITLE: Nanticoke Environmental Study - Phytoplankton Program

KEY WORDS: phytoplankton, trend analysis (seasonal and long term), nearshore

INVESTIGATOR AND AFFILIATION: G. Hopkins, Taxonomy Unit, Limnology and Toxicity Section

LIAISON OFFICER OR SUPERVISOR: K. Nicholls

RESEARCH CATEGORY: INTERNAL — X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE: a) To measure seasonal and long term changes in phytoplankton in the nearshore area of Long Point Bay and to determine if any long term trends have been established and if the industrialization of the area have affected these trends.

b) To relate phytoplankton biomass to chemical and physical parameters (particularly phosphorus and temperature) collected during the same period by other N.E.C. project workers.

DESCRIPTION: As part of the Nanticoke Environmental Committee's (NEC) studies on water quality in Long Point Bay, Lake Erie, phytoplankton samples have been collected at several stations during the ice-free period of each year from 1969 to 1978. The data collected have been used to assess the effect of industrialization in the area.

From 1980 to 1983 samples are to be collected on a bi-weekly basis as photic zone composites at eight locations. In order to maintain continuity, information on temperature and secchi disc will be collected at these same locations at the same frequency. Water quality and chlorophyll a information will be collected at five stations in the same area.

DURATION OF PROJECT: 12 YEARS — PRESENT YEAR IS: 11 YEAR — REPORTING DATE: 1984

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$12,000		0.3

SOURCE OF FUNDS: 50/50 Provincial/Federal — REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT COA — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: A final report of highlights and significant trends will be completed in 1984.

MOE 1293 6/76

Ministry of the Environment
Ontario

WR-20

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources Branch DATE: July 1982

PROJECT TITLE: Bay of Quinte - Inorganic and Organic Contaminants

KEY WORDS: inorganic and organic contaminants, water quality, sediments, bioaccumulation, sources, sinks

INVESTIGATOR AND AFFILIATION: M. Zarull, Surveillance Unit, Great Lakes Section

LIAISON OFFICER OR SUPERVISOR: R. Weiler

RESEARCH CATEGORY: INTERNAL — X GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE: To examine the inorganic and organic contaminant conditions in the Bay of Quinte. The program is to investigate both sources and sinks as well as bioaccumulation.

DESCRIPTION: Previous studies of contaminant sources and sinks in the Bay of Quinte as performed by federal and provincial agencies, have focused on inorganics. Much of the available information is either incomplete or out-or-date. Therefore, a comprehensive study of contaminants in the bay is essential from a drinking water supply perspective, as well as an increased recreational use perspective:

Point source(s) and non-point source(s), mainly in the upper bay, will be sampled seasonally. Sediment samples will be collected at locations which showed elevated levels of inorganics and PCBs in a previous study (1972). In addition, macrophyte samples will be collected in these areas to examine bioaccumulation. Continued sampling for specific organics in the water, sediment and biota will be contingent upon the initial levels being above the existing lab detection limits.

DURATION OF PROJECT: 1 YEARS PRESENT YEAR IS: 1 YEAR REPORTING DATE: 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$118,000		0.5

SOURCE OF FUNDS: 50/50 Provincial/Federal REGULAR WORK PROGRAM X SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT COA OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Aspects to be completed include a review of results with possible recommendations for modifications to point and non-point source monitoring programs, identification of point sources of contaminants and recommendations for remedial programs, an update of previous information on sediments and biota.

MOE 1293 6/78

Ministry of the Environment
Ontario

WR-21

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources Branch

DATE: July 1982

PROJECT TITLE: Toronto Waterfront Circulation

KEY WORDS: nearshore currents, water quality, municipal/river discharges, dredging, lakefilling, numerical model

INVESTIGATOR AND AFFILIATION: M. Griffiths, Y. Hamdy, R. Weiler, Great Lakes Section

LIAISON OFFICER OR SUPERVISOR: J. Kinkead

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE: To document the physical processes in the Toronto Waterfront area between Humber Bay in the west and R.C. Harris water filtration plant in the east.

DESCRIPTION: The Ministry, City of Toronto and other agencies have expressed concern regarding the effects of municipal and river discharges and effects of dredging and lakefilling on Toronto Waterfront water quality. In order to adequately assess these effects, the circulation patterns prevailing in these areas must be known so that dispersion assessments can be made.

The study will assess the impact of Main STP, Humber STP and Humber River discharges on the nearshore waters through the use of an existing finite element numerical model. Several current meters will be moored along the Toronto Waterfront to document the circulation pattern in the area as well as to provide input to the numerical model. Six current meters were previously moored in the eastern sector of the Toronto Waterfront from May 1981 to October 1981.

DURATION OF PROJECT: 3 YEARS — PRESENT YEAR IS 2 YEAR — REPORTING DATE 1984

BUDGET: TOTAL DOLLARS — TOTAL PROJECT / CURRENT YEAR $50,000; MAN YEARS — TOTAL PROJECT / CURRENT YEAR 0.5

SOURCE OF FUNDS: 50/50 Provincial/Federal — REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT COA — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Data analysis and interpretation of 1981 information will be carried out during 1982-83. A detailed report will be written during 1983-84 describing the physical processes and circulation patterns in the Toronto waterfront which will aid in dispersion assessments of various inputs discharging into the area.

MOE 1293 6/78

Ministry of the Environment
Ontario

WR-22

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources Branch

DATE: July 1982

PROJECT TITLE: Toronto Waterfront - Sediment Quality Assessment

KEY WORDS: sediment, nearshore, sources, characteristics, lakefill movement

INVESTIGATOR AND AFFILIATION: D. Persaud, Investigation & Assessment Unit, Great Lakes Section

LIAISON OFFICER OR SUPERVISOR: J. Kinkead

RESEARCH CATEGORY: INTERNAL — X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE: To define the sources and characteristics of sediment in Nearshore Toronto and assess the potential for future open water spoils disposal and lakefilling operations.

DESCRIPTION: The nearshore area of Lake Ontario in the vicinity of Metropolitan Toronto receives a variety of sediment inputs ranging from watershed drainage to sewage treatment plant discharges. Various activities along the waterfront such as lakefilling and shoreline erosion also contribute to the overall sediment input to the region. In the past open water dredge spoils disposal in certain areas of the nearshore contributed to the sediment load until the early 1960's.

This study will attempt to consolidate all relevant available information on sediment characteristics in the nearshore area along Metro Toronto. Sediment information has been gathered by MOE and agencies such as MTRCA over the years. Additional information will be collected where necessary to supplement the existing data. The study will provide information on the behavior and movement of lakefill material along the bottom adjacent to the East Headland. Estimates of the residence time and potential impacts of such material will be made. Information on the abandoned dredge disposal sites will also be collected.

DURATION OF PROJECT: 2 YEARS

PRESENT YEAR IS: 1 YEAR

REPORTING DATE: 1984

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$65,000		0.5

SOURCE OF FUNDS: 50/50 Provincial/Federal

REGULAR WORK PROGRAM — X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — COA — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: The findings will be used as the basis for recommendations on open water spoils disposal and lakefilling operations along Metro Toronto and vicinity waterfront.

MOE 1293 6/76

Ministry of the Environment
Ontario

WR-23

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources Branch

DATE: July 1982

PROJECT TITLE: Nearshore Cladophora Contaminant Monitoring - Lake Ontario and Niagara River

KEY WORDS: Cladophora, nearshore, monitoring, contaminants (heavy metals, PCBs), nutrients

INVESTIGATOR AND AFFILIATION: M. Jackson, Taxonomy Unit, Limnology and Toxicity Section

LIAISON OFFICER OR SUPERVISOR: K. Nicholls

RESEARCH CATEGORY: INTERNAL — X — GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT —— CONCURRENT PROJECT ——

OBJECTIVE:
1) To monitor Cladophora contaminant levels (nutrients, heavy metals, PCBs) at selected sites in Lake Ontario and the Niagara River.
2) To evaluate these data as evidence at point source contaminant loadings.
3) To establish a quantitative data base for comparison of future change.

DESCRIPTION: Investigations by MOE have shown that Cladophora, which proliferates in nearshore waters throughout the lower Great Lakes and connecting channels, bioaccumulates a variety of contaminants in proportion to environmental supply in water. Since 1980, Cladophora has been used as a practical biomonitoring tool to assess the source and fate of contaminant loading to the Niagara River and Lake Ontario.

Twenty-six nearshore sites in Lake Ontario (11 sites) and the Niagara River (15 sites) will be sampled monthly June through August. Data collection includes 1) Cladophora biomass for determination of internal concentrations of PCBs and selected heavy metals and nutrients, 2) water samples for determination of external concentrations of selected heavy metals and nutrients. Future analyses will allow for time trend evaluation and point source discharge evaluation.

DURATION OF PROJECT: ongoing YEARS — PRESENT YEAR IS 3 YEAR — REPORTING DATE 1983/84

BUDGET: TOTAL DOLLARS — TOTAL PROJECT —— CURRENT YEAR $44,000 — MAN YEARS — TOTAL PROJECT —— CURRENT YEAR 0.4

SOURCE OF FUNDS: 50/50 Provincial/Federal — REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— COA —— OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: A report of the findings will be prepared in 1983/84. Information will be used as complementary data to contaminant surveillance programs and reportings on Niagara River toxic contaminants and Lake Ontario water quality.

MOE 1293 6/76

Ministry of the Environment
Ontario

WR-24

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources Branch

DATE: July 1982

PROJECT TITLE:
Toronto Waterfront Bioaccumulation

KEY WORDS: bioaccumulation, metals, organic contaminants, invertebrates, fish

INVESTIGATOR AND AFFILIATION: M. Griffiths, K. Suns; Great Lakes Investigation Unit, Toxicity Unit

LIAISON OFFICER OR SUPERVISOR: J. Kinkead

RESEARCH CATEGORY: INTERNAL — X; GRANT —; UNSOLICITED CONTRACT —; SOLICITED CONTRACT —; MULTI-YEAR PROJECT —; CONCURRENT PROJECT —

OBJECTIVE:
To investigate the degree of bioaccumulation of metals and organic contaminants in local biota (invertebrates) and test organisms (clams, fish) exposed to Toronto Waterfront waters.

DESCRIPTION:
The effect of trace contaminants found in the Toronto Waterfront on biota is largely unknown. A pilot study carried out in 1981 using clams as biomonitor organisms has yielded promising information on regional differences in trace contaminant uptake within the Toronto Waterfront.

Bioaccumulation of trace contaminants (metals, pesticides) in local population of worms will be investigated and the uptake of trace contaminants by fish and clams will be tested by measuring their levels in the water, suspended sediments, sediment and the biota. Whenever possible, both total and "free" (mobile) portions of the contaminants will be assessed. This study will be conducted in conjunction with NWRI's biotoxicity research program conducted in an experimental pond located on the Eastern Headland.

DURATION OF PROJECT: 3 YEARS; PRESENT YEAR IS: 2 YEAR; REPORTING DATE: 1984

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$45,000		0.3

SOURCE OF FUNDS: 50/50 Provincial/Federal; REGULAR WORK PROGRAM X; SPECIAL MINISTRY FUNDING —; JOINTLY FUNDED PROJECT COA; OTHER —

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:
NWRI

REMARKS:
Report preparation of 1982 data. These data will document the bioaccumulation of trace contaminants and aid in future evaluations of dredge spoil material including that from the Keating Channel.

MN 1293 6/76

Ministry of the Environment
Ontario

WR-25

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources Branch

DATE: July 1982

PROJECT TITLE: Nanticoke

KEY WORDS: water quality, thermal discharge, plume tracking, fish, phytoplankton, zooplankton studies

INVESTIGATOR AND AFFILIATION: R. Weiler, Surveillance Unit, Great Lakes Section

LIAISON OFFICER OR SUPERVISOR: D. Jeffs

RESEARCH CATEGORY: INTERNAL — X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE: Maintain surveillance of the impact of increased industrial and municipal development on the nearshore zone at Nanticoke.

DESCRIPTION: Large-scale industrial development (the Lake Erie Steel mill, Stelco Inc; refinery, Texaco Canada; thermal generating station, Ontario Hydro) is taking place in the coastal region around Nanticoke on Long Point Bay, Lake Erie. To protect water quality, chemical, biological and physical conditions have been monitored since 1968 by the Nanticoke Environmental Committee, representing MOE, MNR, Ontario Hydro, Stelco and Texaco. The monitoring will continue until 1983/84.

Water quality and phytoplankton numbers and speciation will be monitored during the period April-November at up to 7 stations as a biweekly basis by MOE. The effluent plume from Centre Creek, which serves as the outfall for Stelco, will also be traced by MOE. Fish and zooplankton studies will be carried out by MNR and water temperature monitoring by Ontario Hydro. A report summarizing the findings of the study for the period 1968-1978 is under preparation.

DURATION OF PROJECT: 15 YEARS — PRESENT YEAR IS: 14 YEAR — REPORTING DATE: 1984/85

BUDGET: TOTAL DOLLARS — TOTAL PROJECT — CURRENT YEAR $28,000 — MAN YEARS — TOTAL PROJECT — CURRENT YEAR 0.1

SOURCE OF FUNDS: 50/50 Provincial/Federal — REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT COA — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: Ontario Hydro, MNR

REMARKS: Field studies will be completed in 1983/84. A report on the studies for the period 1978-83 will be prepared in 1984/85.

MOE 1293 8/76

Ministry of the Environment
Ontario

NR-26

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources Branch

DATE: July 1982

PROJECT TITLE: Lake Ontario - Port Hope

KEY WORDS: Ganaraska River/Port Hope harbour discharge, nearshore water movements, temperature and conductivity monitoring

INVESTIGATOR AND AFFILIATION: P. Kauss, Investigation and Assessment Unit, Great Lakes Section

LIAISON OFFICER OR SUPERVISOR: J. Kinkead

RESEARCH CATEGORY: INTERNAL — X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE: To determine the areal extent of the Ganaraska River/Port Hope harbour discharge under varying conditions. Define nearshore water movements to allow prediction of conditions under which Port Hope WTP intakes would be impacted by above discharge.

DESCRIPTION: Regular monitoring of radionuclides has revealed no adverse impacts of the Eldorado Nuclear discharges (to Port Hope harbour) on water quality at the nearby water treatment plant, drawing water from Lake Ontario nearshore. However, in late 1979, a methylene chloride spill at a local industry reached the Ganaraska River, resulting in an extensive fish kill. Detectable concentrations of methylene chloride were also found later in water of the WTP, the two intakes of which are located 0.5 km west of the harbour mouth. A temperature/conductivity plume-tracking study was completed in the fall of 1980 to assess the extent, direction and potential impact of the combined Ganaraska River/Port Hope harbour discharge on the intakes. A preliminary report was forwarded to MOE regional staff discussing the results which indicated that, under conditions of low river flow and westerly wind and current direction, the surface plume was confined mainly to the vicinity of the harbour mouth or was pushed easterly along the nearshore, resulting in little or no impact on the intakes. Current speed/direction and temperature were monitored in the nearshore near the WTP intakes and conductivity and temperature were monitored in treatment plant raw water during 1981. Intensive current and temperature monitoring in Lake Ontario nearshore and monitoring of conductivity at the Port Hope WTP is to continue in 1982.

DURATION OF PROJECT: 4 YEARS

PRESENT YEAR IS: 3 YEAR

REPORTING DATE: 1982

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$10,000		0.1

SOURCE OF FUNDS: 50/50 Provincial/Federal

REGULAR WORK PROGRAM — X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — COA — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Evaluation of recent data and production of interim report in 1982 to be forwarded to MOE regional staff (Southeastern Region) to address issues raised under "objectives".

MOE 1293 6/76

Ministry of the Environment
Ontario

WR-27

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources Branch

DATE: July 1982

PROJECT TITLE: Hamilton Harbour - Effect of Hamilton Harbour on Nearshore Lake Ontario

KEY WORDS: harbour-lake exchange, water quality, nutrients, trace contaminants, plume configuration, physical processes

INVESTIGATOR AND AFFILIATION: D. Poulton, Y. Hamdy, Great Lakes Section

LIAISON OFFICER OR SUPERVISOR: R. Weiler

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE: To investigate the extent of the plumes of Hamilton Harbour water emitted to the lake, the correlation between wind, currents, plume configuration and water quality in the extreme west end of the lake and the effect on water quality at the Hamilton and Burlington water intakes.

DESCRIPTION: Spotty data exist on the harbour plume, its pollutant loading and its extent into the lake. No information is available on the effects of the plume on water quality at the intakes. Concern has been expressed about pollution of drinking water supplies by harbour water.

The configuration of the plume will be measured seasonally in the period of May-October and correlated with wind, currents in the lake and the flux of harbour water out of the canal. Water quality variables, such as nutrients and trace contaminants will be measured in the plume and at the intakes. The intake sampling program will be continued during the winter months. Sediment samples will be collected once during the program and analysed for trace contaminants and benthic fauna.

DURATION OF PROJECT: 1 YEARS — PRESENT YEAR IS 1 YEAR — REPORTING DATE 1983

BUDGET: TOTAL DOLLARS — TOTAL PROJECT — CURRENT YEAR $115,000 — MAN YEARS — TOTAL PROJECT — CURRENT YEAR 1.2

SOURCE OF FUNDS: 50/50 Provincial/Federal — REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — COA — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: Data analysis and synthesis to be completed for assessment of compliance in the nearshore region of western Lake Ontario.

MOE 1293 6/76

Ministry of the Environment
Ontario

WR-28

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources Branch DATE: July 1982

PROJECT TITLE: Biomonitoring of the St. Clair System and Detroit River

KEY WORDS: biomonitoring, organic compounds, point source discharges, uptake effects (short and long term), remedial measures

INVESTIGATOR AND AFFILIATION: Y. Hamdy, P. Kauss, Investigation and Assessment Unit, Great Lakes Section

LIAISON OFFICER OR SUPERVISOR: J. Kinkead

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE:

To assess areas of concern for point source discharges and to provide information relevant to the need for or assessment of remedial measures. Determine the fate of organic compounds in the St. Clair System.

DESCRIPTION: The St. Clair River Organics Study (1977/78) indicated that several of chlorinated aromatics and chlorophenol compounds are discharged to the river. Industries such as Dow Chemical and Polysar have extended some of the outfalls into the river to achieve adequate dispersion and minimize the impact on industrial intakes located along the shore. A study carried out during 1980 in the Detroit River revealed that river sediments are heavily contaminated with PCB's and pesticides, especially near the River Rouge and Detroit sewage treatment plant. Biomonitoring sampling using fresh water clams will be carried out at 12 sites along the Ontario shoreline of the St. Clair River, 8 sites in the St. Clair Delta and Lake St. Clair and 15 sites along the Ontario and U.S. shorelines of the Detroit River. In addition, Southwestern Region will be providing native clams from Lake St. Clair to enable differentiation between short and long term uptake effects. Analyses will be carried out for PCB's, organochlorine pesticides, chlorinated aromatics, chlorophenol compounds.

DURATION OF PROJECT: 1 YEARS PRESENT YEAR IS 1 YEAR REPORTING DATE 1983

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$95,000		2.0

SOURCE OF FUNDS: 50/50 Provincial/Federal REGULAR WORK PROGRAM X SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OMA OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: A report highlighting the significance of source inputs will be prepared in 1983.

MOE 1293 6/78

Ministry of the Environment
Ontario

WR-29

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources Branch

DATE: July 1982

PROJECT TITLE:
Toronto Waterfront - Effects of Dredging/Lakefilling Activities

KEY WORDS: water quality, raw and treated water, monitoring, turbidity plumes, dredging, dredge disposal, lakefilling, storm conditions

INVESTIGATOR AND AFFILIATION: M. Griffiths, Investigation and Assessment Unit, Great Lakes Section

LIAISON OFFICER OF SUPERVISOR: J. Kinkead

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE: To monitor the raw and treated water at Toronto water treatment plants during storms, other periods of high turbidity and during the thermal bar formation to ensure that no objective violations are occurring. To determine the extent of turbidity (and associated contaminants) plumes arising from dredging, dredge disposal and lakefilling sites along the Waterfront following storm conditions.

DESCRIPTION: Intensive studies were conducted during 1980-81 in the Toronto Waterfront to monitor the effects of dredging and disposal of Keating Channel sediments. Although the dredging/disposal effects appeared to be localized (as documented in Ministry publications on the effects of dredging and disposal at the Headland), there was no information on whether this is also true during storm conditions. In view of construction activities such as lakefilling at the Headland and the dredging/disposal operations, it is necessary to ensure that adjacent Toronto water supplies are not affected by these activities.

The raw and treated water at the Toronto filtration plants will be monitored for heavy metals, PCBs and organochlorine pesticides during periods of thermal bar formation; storms and high turbidity events. Several plume tracking surveys will be carried out to document the extent of turbidity and contaminant plumes emanating from dredging, dredged spoil disposal and lakefilling sites following storm conditions. Aerial photography will be employed as an aid in investigating the areal extent of the turbidity plumes.

DURATION OF PROJECT: ongoing YEARS — PRESENT YEAR IS: 3 YEAR — REPORTING DATE: 1984

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
		$195,000		1.5

SOURCE OF FUNDS: 50/50 Provincial/Federal — REGULAR WORK PROGRAM X — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT COA — OTHER —

IS A REPORT ANTICIPATED?
Yes

PARTICIPATION BY OTHER MINISTRIES:

REMARKS: 1982-1983 data will be analyzed and a report prepared in 1984 discussing the findings. This information will provide guidance to plant operators on what changes, if any, occur during the events outlined above. Contingency measures, if required, can be instituted at the plants to ensure that safe drinking water standards are maintained. In addition, routinely upon receipt of the results, these data will be communicated to concerned agencies, (including Metro Works, Toronto City Health Department) to ensure safety of Toronto water supply.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

WR-30

BRANCH: Water Resources

DATE: August 1982

PROJECT TITLE: Effects of Depressed pH on Brook Trout Reproductive Physiology

KEY WORDS: pH, Brook Trout, Reproduction, Oogenesis, Spermatogenesis, Histology, Biochemistry, Sex Steroids.

INVESTIGATOR AND AFFILIATION: Dr. Tam R. Roy — Dept. of Zoology, University of Western Ontario

LIAISON OFFICER OR SUPERVISOR: G.R. Craig & J. Munro

RESEARCH CATEGORY: INTERNAL —— GRANT —— UNSOLICITED CONTRACT X SOLICITED CONTRACT —— MULTI-YEAR PROJECT X CONCURRENT PROJECT ——

OBJECTIVE:
To develop fisheries assessment tool to detect reproductive failure within fisheries indigenous to acid sensitive lakes.

DESCRIPTION:
Sexually mature brook trout are collected from lakes exhibiting various levels of acidification. Gonads are histologically examined and the degree of sexual development is determined and compared with control lake fish. Results will be used to develop a model that will identify normal and abnormal reproductive development in fisheries in acid sensitive lakes.

DURATION OF PROJECT: 3 YEARS — PRESENT YEAR IS: 2 YEAR — REPORTING DATE: March 1984

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	70K	30K	6	2

SOURCE OF FUNDS: REGULAR WORK PROGRAM —— SPECIAL MINISTRY FUNDING —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Published papers and Thesis

PARTICIPATION BY OTHER MINISTRIES: Lake selection and fish collection is assisted by MNR.

REMARKS:

Ministry of the Environment
Ontario

WR-31

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources *DATE:* 1982

PROJECT TITLE: Nearshore Fish Contaminants Surveillance - Great Lakes

KEY WORDS: Spottail Shiners, Contaminants, Trends, Contaminant Uptake.

INVESTIGATOR AND AFFILIATION: K. Suns

LIAISON OFFICER OR SUPERVISOR: G.R. Craig

RESEARCH CATEGORY: *INTERNAL* X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* —— *CONCURRENT PROJECT* ——

OBJECTIVE:

-Establish data base for temporal trend assessment.
-Identify areas of concern for point-source identification.
-Use juvenile fish data as an early warning system for bioaccumulation material identification.

DESCRIPTION:

Annually collections of young-of-the-year spottail shiners are used for contaminant residue determinations.
Criteria governing site selections are:
1) Need to monitor contaminant discharges from major watersheds to the Great Lakes.
2) Discharges from specific industries.
Juvenile spottail shiners have proven to be reliable bioaccumulators of all principal trace contaminants.

DURATION OF PROJECT: On-going ——— *YEARS* *PRESENT YEAR IS* 8th ——— *YEAR* *REPORTING DATE:* Annually

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	300,000	58,000	4	4

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: None

REMARKS:

Ministry of the Environment
Ontario

WR-32

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: August 1982

PROJECT TITLE: Fish Contaminant Investigations in Acid Sensitive Ontario Lakes

KEY WORDS: Yellow perch, smallmouth bass, Mercury, Lead, Cadmium, pH, Alkalinity, Condition factors, Contaminant uptake.

INVESTIGATOR AND AFFILIATION: K. Suns

LIAISON OFFICER OR SUPERVISOR:

RESEARCH CATEGORY: INTERNAL X — GRANT — UNSOLICITED CONTRACT — SOLICITED CONTRACT — MULTI-YEAR PROJECT — CONCURRENT PROJECT —

OBJECTIVE:

Monitor mercury, lead, cadmium accumulations in fishes and their relationship to water quality.

Relate fish residue accumulations to biological responses, fish health and human health implications.

DESCRIPTION:

Annual collections of yearling yellow perch have been used to establish contaminant uptake and their relationships to lake acidification.

Yearling yellow perch have also been used to develop contaminant data base for trend assessment.

Relationships between yearling perch and adult bass contaminant burdens have been established in Muskoka lakes, as well as their condition factors.

DURATION OF PROJECT: 5 YEARS — PRESENT YEAR IS 1 YEAR — REPORTING DATE

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	38,000	38,000	1/2	1/2

SOURCE OF FUNDS: REGULAR WORK PROGRAM — SPECIAL MINISTRY FUNDING — JOINTLY FUNDED PROJECT — OTHER —

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

MNR

REMARKS:

MOE 1724 6/76

Ministry of the Environment
Ontario

WR-33

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources

DATE: August 1982

PROJECT TITLE: Development of a freshwater fish test to identify aquatic genotoxic contaminants.

KEY WORDS: Aquatic, genotoxic, fish, zebra fish, embryo-larval testing.

INVESTIGATOR AND AFFILIATION: Dr. V.E. Valli.Mr. I.R. Smith
Dept. of Pathology, University of Guelph,

LIAISON OFFICER OR SUPERVISOR: G.R. Craig

RESEARCH CATEGORY:
INTERNAL —— *GRANT* ——
UNSOLICITED CONTRACT X *SOLICITED CONTRACT* ——
MULTI-YEAR PROJECT X *CONCURRENT PROJECT* ——

OBJECTIVE: To develop an aquatic genotoxic fish test capable of identifying mutagens in receiving water and complex waste mixtures using bioaccumulation rather than chemical concentration techniques.

DESCRIPTION:
Zebra fish embryos are exposed to known mutagenic agents and specific tissues are removed for histopathological examination. Evidence of chromosomal aberation will be sought using conventional mammalian cytogenic techniques.

A genotoxic protocol will be developed using fish to identify active compounds singly of in complex mixtures and developed as a screening test to monitor and protect water quality.

DURATION OF PROJECT: 2 YEARS
PRESENT YEAR IS: 1st YEAR
REPORTING DATE: March 1984

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	Appr. 45,000	22,131	3.0	1.5

SOURCE OF FUNDS:
REGULAR WORK PROGRAM ——
SPECIAL MINISTRY FUNDING Hazardous Contaminants
JOINTLY FUNDED PROJECT ——
OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY WR-34

BRANCH: Water Resources *DATE:* August 1982

PROJECT TITLE: Toxicity of Multiple Organics

KEY WORDS: Chlorinated benzenes, chlorinated phenols, lethality, sublethal effects, embryo-larval toxicity, fish toxicity, brook trout, flagfish.

INVESTIGATOR AND AFFILIATION Dr. G.W. Ozburn, Biology Dept, Lakehead University, Thunder Bay

LIAISON OFFICER OR SUPERVISOR G.R. Craig

RESEARCH CATEGORY: *INTERNAL* —— *GRANT* X *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X *CONCURRENT PROJECT* ——

OBJECTIVE: Determine water quality objectives for chlorinated benzenes and chlorinated phenols singly and in combination based on the lethal and sublethal effects on brook trout and flagfish.

DESCRIPTION:

Brook trout and flagfish eggs, fry and juveniles are exposed to chlorinated benzenes, phenols and mixtures of the two. Survival, growth and organic accumulation are measured to determine highest no-effect concentrations.

Water quality objectives will be developed from this data to control industrial discharges.

DURATION OF PROJECT 3 YEARS *PRESENT YEAR IS* 2 YEAR *REPORTING DATE* March 1984

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	$340,440*	$32,600 from MOE	None from MOE	

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* —— *SPECIAL MINISTRY FUNDING* —— *JOINTLY FUNDED PROJECT* X —— *OTHER* MOE Lottery & ~~Hazardous~~ Contaminants EPS

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES: No

Environment Canada - EPS is a partner.

REMARKS: See Page PL-12.

*Contribution from Lottery Funds is one half, e.g. $170,220.

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

WR-35

BRANCH: Water Resources *DATE:* August 1982

PROJECT TITLE: Fish Interspecies Comparison of Sensitivity to Episodic Depressed pH Stream Conditions.

KEY WORDS: Fish, Lethality, pH, Episodic stream pH depression, Lake Trout, Brook Trout, Smallmouth Bass, Rainbow Trout, Sunfish, Forage Fish, Fish Caging.

INVESTIGATOR AND AFFILIATION: T. Pawson

LIAISON OFFICER OR SUPERVISOR: J. Munro & G.R. Craig

RESEARCH CATEGORY: *INTERNAL* X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X — *CONCURRENT PROJECT* ——

OBJECTIVE:

Determine the relative sensitivity of juvenile fish species under natural episodic stream pH depression. Relate lethal responses to changes in water quality.

DESCRIPTION:

Various fish species are held in streams and lake littoral zones during episodic spring and fall stream runoff events. Lethality of species is compared and related to water quality. Data will be used to estimate potential fisheries impact and provide direction for MNR fishery surveillance programs.

DURATION OF PROJECT 5 *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* Annually

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	180K	60K	12.5	2.5

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* —— *SPECIAL MINISTRY FUNDING* APIOS *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:

Consultation and planning with MNR.

REMARKS:

Ministry of the Environment
Ontario

RESEARCH AND DEVELOPMENT INVENTORY

WR-36

BRANCH: Water Resources Branch

DATE: August 1982

PROJECT TITLE: Effects of Depressed pH and Elevated Aluminum on Fish Respiration Physiology

KEY WORDS: Fish, Sublethal Effects, Respiration, Blood Gas, Electrolytes, Rainbow Trout, Brook Trout, Lake Trout.

INVESTIGATOR AND AFFILIATION: Dr. C.N. Neville

LIAISON OFFICER OR SUPERVISOR: J. Munro
G.R. Craig

RESEARCH CATEGORY: INTERNAL X — GRANT —— UNSOLICITED CONTRACT —— SOLICITED CONTRACT —— MULTI-YEAR PROJECT X —— CONCURRENT PROJECT ——

OBJECTIVE: Identify sublethal and lethal effects of depressed pH and elevated metal concentrations on fish respiratory physiology. Develop physiological indicators of stress in fisheries indigenous to acid sensitive lakes.

DESCRIPTION:
Fish are acclimated to soft water, surgically cannulated and exposed to depressed pH and aluminum. Opercular ventilation and coughs are monitored. Blood samples are collected and pH, PO_2, PCO_2, haemoglobin, O_2 carrying capacity, plasma electrolytes are measured. Gill and kidney are examined by histopathology.

Data will be used to determine physiological indicators of acid stress in fisheries.

DURATION OF PROJECT: 5 YEARS — PRESENT YEAR IS 2 YEAR — REPORTING DATE: Annually

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	CURRENT YEAR	TOTAL PROJECT	CURRENT YEAR
	150K	30K	7½	1½

SOURCE OF FUNDS: REGULAR WORK PROGRAM —— SPECIAL MINISTRY FUNDING APIOS —— JOINTLY FUNDED PROJECT —— OTHER ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
No

REMARKS:

MOE 1293 6/76

Ministry of the Environment
Ontario

WR-37

RESEARCH AND DEVELOPMENT INVENTORY

BRANCH: Water Resources *DATE:* August 1982

PROJECT TITLE: Fish Interspecies Comparison of Sensitivity to Depressed pH and Aluminum

KEY WORDS: Fish, Embryo larvae, Lethality, pH, Aluminum, Electrolytes, Brook Trout, Rainbow Trout, Smallmouth Bass, Lake Trout, White Sucker, Whitefish.

INVESTIGATOR AND AFFILIATION: K.E. Holtze

LIAISON OFFICER OR SUPERVISOR: J. Munro & G.R. Craig

RESEARCH CATEGORY: *INTERNAL* X — *GRANT* —— *UNSOLICITED CONTRACT* —— *SOLICITED CONTRACT* —— *MULTI-YEAR PROJECT* X — *CONCURRENT PROJECT* ——

OBJECTIVE: Determine levels of depressed pH and aluminum that impair the survival of sensitive life stages of important sport forage and other fish species in acid stressed lakes.

DESCRIPTION:
Embryo-larval life stages of brook trout, lake trout, smallmouth bass, forage and other fish will be exposed to depressed pH and aluminum to compare species sensitivity. Survival data will be incorporated in fisheries management models and provide direction for MNR surveillance programs.

DURATION OF PROJECT 5 *YEARS* *PRESENT YEAR IS* 2 *YEAR* *REPORTING DATE* Annually

BUDGET:

	TOTAL DOLLARS		MAN YEARS	
	TOTAL PROJECT	*CURRENT YEAR*	*TOTAL PROJECT*	*CURRENT YEAR*
	180K	60K	12.5	2.5

SOURCE OF FUNDS: *REGULAR WORK PROGRAM* —— *SPECIAL MINISTRY FUNDING* APIOS — *JOINTLY FUNDED PROJECT* —— *OTHER* ——

IS A REPORT ANTICIPATED? Yes

PARTICIPATION BY OTHER MINISTRIES:
Consultation and planning with MNR.

REMARKS:

MOE 1293 6/76

INDEX

"A"

A/C Pipe LS-16

Acid Precipitation LS-53, WR-1, WR-10

Acid Precipitation Estimation AR-14

Acidification WR-10, WR-16

Acidification of Ground Waters WR-10

Activated Sludge Systems LS-2

Aeration WR-12

Aerobic Digestion LS-4

Aerosol AR-4, AR-8, AR-10, AR-17, AR-18

Aerosol Movement Across the Great Lakes AR-10

Agriculture and Food Canada PL-9

Air Analysis AR-1

Air Classification WM-6

Air Contamination in Cities PL-6

Air Particulate Matter LS-45

Air Particulates Analysis LS-51

Air Pollution PL-8

Air Pollution Costs PL-17

Air Pollution Effects on Corn and Beans AR-11

Air Pollution Standards AR-7

Airborne Hazardous Materials AR-9

Airborne Mutagens PL-16

Airborne Particulate Matter AR-2, AR-17

Airborne Pollutants AR-8

Aldicarb PAC-5

Aldicarb Residues in Soil PAC-5

Algae WR-15

Algae Assays WR-17

Allidichlor PAC-25

Alum LS-23

Aluminum Chloride PL-14

Aluminum Effects on Fish WR-37

Ammonia Control LS-1

Amphiboles LS-55, LS-56

Anaerobic Digester LS-5

Analysis for Aerosols AR-4

Analysis of Asbestos in Air AR-16

Analysis of nitro PAH's AR-12

Analysis of Organics in Water PL-5

Analytical Methodology for nitro-PAH's AR-12

Analytical Methodology for PAH's AR-18

Analytical Standards for PAH's and Aza-PAH's AR-13

Animals LS-14

APIOS WR-10

APIOS Ground Water Studies WR-4

Apple Pest Management PAC-24

Aquatic Genotoxic Contaminants WR-33

Aquatic Toxicity PL-12

Aromatics in Air AR-3

Arsenic in Air AR-15

Asbestos AR-16
LS-10
LS-16
LS-55

Asbestos Air Pollution AR-16

Asbestos Cement Pipe LS-54

Asbestos Leaching LS-54

Ashbridges Bay Sewage Sludge Incinerator (Toronto) AR-20

Atmospheric Pollutants LS-82

Atmospheric Precipitation LS-46

Atomic Absorption LS-47

Atomic Fluorescence Spectrometry AR-15

Atrazine PAC-11

Attenuation of Leachate PL-10

Automation LS-64

Aza PAH Standards AR-13

"B"

Bacterial Contamination PL-1

Basins WR-7

Bay of Quinte WR-13
WR-20

Beak Consultants Ltd. PL-4

Beans AR-1
PAC-26

Benlate Fungicide PAC-26

Benzopyrene AR-7

Best Pipe WM-7

Bioaccumulation WR-20
WR-24

Biocontrol PAC-1

Biological Control PAC-1
PL-9

Biological Control of Spruce Insects PAC-9
PAC-10

Biological Testing PL-12

Biomonitoring WR-28

Biting Fly Control PAC-20

Blight on Potatoes AR-6

BOD_5 LS-63

BOT CAST PAC-21

Botrytis in Onions PAC-21

Bradford Marsh PAC-25

Bromide LS-59

Brook Trout WR-30
WR-34
WR-35

Brook Trout Reproductive Psysiology WR-38

Bulrushes PL-1
WR-11

"C"

Cabbage Thrips PAC-14

Cadmium in Fish WR-32

Canada Centre for Inland Waters WR-13

Canadian Forestry Service PAC-9

Capillary Columns LS-72

Carbaryl PAC-12

Carcinogens PL-16

Chemicals LS-13

Chemical Precipitation LS-2

Chemical Protectants AR-11

Chemical Research International PAC-18

Chlorinated Aromatics (PCB's) AR-20

Chlorinated Benzenes and Phenols WR-34

Chlorinated Industrial Organics LS-71

Chlorinated Organics LS-27

Chlorination LS-22
PL-4

Chlorination-Dechlorination System LS-6

Chlorine PL-3

Chlorodibenzofurans LS-70

Chlorophyll LS-60

Chrysotile LS-55

City of Windsor Compost WM-4

Cladophora WR-16

Cladophora Nearshore Monitoring WR-23

Clams WR-24
WR-28

Cobalt LS-46

Co-disposal of Waste WM-10

Cold Vapour Atomic Fluorescence LS-48

Collection of Glass WM-5

Combined Sewer Pollution PL-7

Commissioners Street Incinerator (Toronto) AR-20

Compost WM-1
WM-3
WM-4
WM-6

Compost Utilization WM-4

Conductivity Monitoring WR-26

Conference Information PL-15

Conestoga Rovers Ltd. WM-7

Container Production WM-1
WM-2

Contaminant Uptake in Fish WR-31

Contaminants at Near Shore WR-23

Contaminants in the Bay of Quinte WR-20

Control of Mice PAC-18

Controlled Droplet Applicator PAC-2

Controller LS-57

Corn PAC-8

Corrosion LS-16

Crop Interference PAC-7

Cutworms PAC-13

Cyanide LS-43

Cyclopenta pyrene AR-7

"D"

Data Handling LS-49

Datapod PAC-21

Deposition of Acid Rain WR-10

Depressed pH on Brook Trout WR-38

Destratification WR-12

Detroit River WR-28

Dichotomous Sampler AR-17, LS-45

Digested WPCP Sludges LS-24

Differential Pulse Polarography (DPP) LS-46

Dillon, M. M. Ltd. WM-9

Dioxins LS-70

Disinfection LS-21, LS-22, LS-25, LS-27, PL-3, PL-4, PL-15

Disposal of Pesticide Containers PAC-16

Distribution Systems LS-14

DO Measurements LS-63

Dofasco PL-6

Dow Chemical, Sarnia Plant AR-20

Downcast PAC-21

DPASV (Differential Pulse Anodic Stripping Voltammetry) LS-44

Drainage Basin Inventory Studies WR-7

Dredge Disposal WR-29

Dredge Spoil WR-24

Dredging WR-21, WR-29

Dredging/Lakefilling Activities WR-29

Dredging in Toronto WR-22

Drinking Water LS-8, LS-9, PL-3, PL-5, PL-14

Dry & wet weather flows LS-30

Dry Defiberization WM-2

Dust PL-6

"E"

Ecology WR-15

Economic Benefits of Recycling WMAB-1

Effluent Chlorination PL-4

Effluent Treatment PL-15

Effluent Plume LS-22

Effluents from Lagoons PL-18

Electrical Resistivity WR-6

Electrolytes Effects on Fish WR-36

Electron Microscope AR-16

Elevated Aluminum on Fish WR-36

Embryo Larvae Testing WR-33

Embryo Larvae Susceptibility WR-37

Embryo Larvae Toxicity WR-34

Emission Spectroscopy AR-3

Energy Dispersive X-ray LS-51

Energy Production WM-7

Environment Canada PL-6, PL-7, PL-12, WM-7, WM-8, WM-10, WR-19

Environmental Analytical Standards AR-13

Environmental Assessment WMAB-2

Environmental Contaminants PL-20

Environmental Fate of Trichlopyr PAC-19

Environmental Planning WMAB-2

Enteric Viruses LS-38, LS-39

Eutrophication Studies WR-15

Episodic Stream pH Depression WR-35

Essex County PAC-13

Experimental Marsh PL-1

Experimental Plant for Resource Recovery WM-6

Explosion Hazard PL-2

Extended Aeration LS-1, LS-7

Extraction LS-77, LS-78, LS-79

"F"

Fall Panicum PAC-1

Fast Food Restaurants AR-5

Fast Phase Separators LS-78

Fate of Organics in St. Clair System WR-28

Fecal Coliform LS-40

Ferric Chloride LS-23

Ferrous Metal from Garbage WM-6

Field Beans AR-1

Field Sampler LS-82

Field Test Kits LS-28

Filamentous Algae Program WR-16

Filtration with $AlCl_3$ and Celite LS-39

Fish LS-69, WR-24, WR-25

Fish Analysis LS-72

Fish Caging WR-35

Fish Contaminants Investigations WR-32

Fish Interspecies Comparison WR-35

Fish Interspecies Comparison to pH and Aluminum WR-37

Fish Lethality WR-35, WR-37

Fish Respiration Physiology WR-36

Fish Testing PL-12

Fish Toxicity WR-34

Flag Fish WR-34

Flooding PL-7

Flow Injection Analysis LS-61

Fluorescence AR-3, WMAB-3

Fluoride LS-42, LS-65

Foliar Analysis WM-1

Foliar and Soil Analysis WM-1

Food Losses PAC-15

Forage Fish WR-35

4 - AAP Method LS-62

Fungicides for Turfgrass PAC-3

Fungicides for Vegetables PAC-21

"G"

Gage Research Institute PL-8

Ganaraska River WR-26

Garbage Gas PL-2

Garbage Site PL-2

Gartner Lee Associates PL-19, WR-5

Gas Chromatograph AR-15

Gas from Landfill Sites WM-8

Gas Migration WM-7

Gas Migration Study WM-8

Gas Production PL-2

Gas Production in Landfills WM-9

GC - AFS Methods for Hg and As in Air AR-15

Genotoxic Hazards PL-20

Geophysics WR-6

Georgian Bay WR-15

Glass Collection WM-5

Glass Fibre LS-56

Golder Associates Ltd. WM-10

Gore & Storrie Ltd. PL-1

Government Decision-Making WMAB-2

Gravenhurst WR-13

Green Beans AR-11

Ground Water WR-1

Ground Water Contaminants WR-2, WR-6

Ground Water Exploration WR-6

Ground Water Infiltration WR-5

Ground Water Quality in Ontario WR-3

"H"

Hamilton PL-6

Hamilton Harbour LS-36, WR-27

Harbour Discharge at Port Hope WR-26

Harbour - Lake Exchange at Hamilton WR-27

Harvesting Bulrushes PL-1

Hazardous Compounds PL-12

Hazardous Contaminants LS-35, LS-36, PL-16

Hazardous Waste WM-10

Hazen Units (True Colors) LS-64

HCL Digestion/Extraction LS-74

Health and Welfare Canada PL-8, PL-14

Heart Lake Conservation Authority WR-12

Heavy Metals LS-4, LS-24, PL-1, WR-16, WR-23

Heinz, H. J. & Company PAC-13

Herbicide Needs PAC-4

Herbicide Reduction PAC-7

Herbicide Residues LS-74

Herbicides PAC-19

Herbicides for Onions PAC-25

Herbicides Mixed With Water PAC-2

High Grade Fibres WM-2

High-performance Liquid Chromatography LS-68

High Resolution Capillary GC LS-71

Histology WR-30

Historical Pollution AR-8

Honeybees PAC-12

Human Exposure PL-20

Hydraulic Characteristics PL-4

Hydraulic Dispersion LS-22

Hydride-AA System LS-47

Hydrogen Sulphide LS-1

Hydrogeologic Mapping WR-1

Hydrology Consultants Ltd. PL-2, WM-8

"I"

I.C.P. Spectrometer LS-49

Impoundment LS-29, PL-7

Incineration WM-6

Incineration Samples LS-76

Indicating Ion Exchange AR-14

Indoor-Outdoor Pollution PL-8

Industrial Wastes PL-12

Infrared Sensing WM-9

Infiltration WR-5

Infiltration into Landfills PL-19

Inhalable Particulate Samplers AR-17

Inorganics in Bay of Quinte WR-20

Insect Trap Design PAC-17

Insecticide PAC-5

Insecticides Efficacy PAC-8

Integrated Pest Management PAC-22

Integrated Pest Management in Ontario PAC-24

Interim Method LS-55

International Environmental Consultants Ltd. PL-3

Invertebrates WR-24

Ion Chromatography LS-43, LS-57, LS-58, LS-59

Ion Exchange to Measure Acid Rain AR-14

Ion Specific Electrode LS-65

Iron LS-11

"J"

Jar Testing LS-19, LS-23

"K"

Keating Channel WR-24

Kenics Mixer LS-78

Kennedy-Burnett Pond LS-29, PL-3

Kent County PAC-13

Kitchener Landfill Site WM-7

K-Rates LS-63

"L"

Lagoon Biota PL-18

Lagoon Effluents LS-1

Lagoons LS-7

Lake Acidification WR-15

Lake Ontario Lake Trout LS-75

Lake Restoration WR-12

Lake St. Clair WR-28

Lake Superior Pulp and Paper Effluent WR-18

Lake Trout WR-35

Lakefill Movement WR-22

Lakefilling WR-21, WR-29

Lakehead University PL-12, WR-34

Land Use Planning WR-7

Landfill Covers WR-5

Landfill Gas Energy Extraction WM-7

Landfill Research Activities WM-10

Landfill Sites PAC-16, PL-2, PL-19

Landscaping Trees WM-3

Laser AR-3

Leachates PL-10, WM-9

Lead-210 LS-67

Lead in Fish WR-32

Leaf Blight in Onions PAC-21

Limnos Ltd. PL-18

Listowel Marsh PL-1, WR-11

Loading LS-5

Long Range Transport AR-10

Low Temperature Matrices AR-3

Lower Holland River WR-14

Lysimeters PL-19

"M"

Magnetism LS-8

Manganese LS-9, LS-12

Mapping WR-1

Marsh PL-1

Marsh Treatment of Effluent WR-11

McMaster University AR-2, AR-12, AR-16

Meadow Mice PAC-18

Membrane Filter Procedure LS-40

Mercury LS-47, LS-48

Mercury in Air AR-15

Mercury in Fish WR-32

Metabolites LS-68

Metals WR-17, WR-24

Metalaxyl Residues in Plants, Soils and Watershed PAC-28

Metering of Herbicides PAC-2

Methane PL-2, WM-8

Methomyl PAC-13

Methoxychlor PAC-11

Metro Toronto Sewer System LS-33

Metro Works WR-29

Microbial Degradation of Pesticides PAC-23

Microbiology LS-41

Microcomputer LS-49

Microdiffusion LS-42

Microorganisms PL-4

Migration of Gas WM-7

Migration of Garbage Gas PL-2, WM-8

Migration of Landfill Gas WM-9

Milk Packaging WMAB-3

Mineral Fibres LS-56

Ministry of Agriculture and Food WM-4

Ministry of Energy AR-20, WM-7

Ministry of Labour AR-18

Ministry of Labour: Health Effects and Studies AR-20

Ministry of Natural Resources WR-9, WR-13, WR-15

Mixing LS-5

Monitoring Dormant Seeds PAC-4

Monitoring during Storms WR-29

Monitoring Toronto Waterfront WR-29

Monochromators LS-50

Mosquito Control PAC-20

Mosquito Sampling Techniques PAC-27

Mosquitos PAC-27

MPN LS-38

MTEC (Agar) LS-40

Muck Soils PAC-25

Multi-component Cartridge LS-73

Multielement Analysis in Air AR-15

Municipal/River Discharges WR-21

Municipal Solid Waste WM-4

Municipal Waste WM-10

Municipality of North York WM-5

Mutagens PL-16

"N"

Nanticoke WR-25

Nanticoke Environmental Study WR-19

Nearshore WR-22

Nearshore Currents Toronto Harbour WR-21

Nearshore Fish Surveillance WR-31

Nearshore Monitoring: Lake Ontario and Niagara River WR-23

Nearshore Water Movements WR-26

Nearshore Zone at Nanticoke WR-19

Neutralization WR-9

Neutralization Studies WR-15

Neutron Activation AR-2

Niagara River LS-35

Nickel LS-46

Nitrification-Denitrification LS-1, LS-7

Nitro - PAH's AR-12

Nitro - PAH's in Auto Exhaust and Urban Air AR-12

Nitrogen LS-4

No Sludge Wasting LS-7

NOD Measurements LS-63

Noise PL-11

Non-Chemical Pesticides PL-9

Non-recyable Fibres WM-2

North York Source Separation Feasibility Study WM-5

Numerical Model for Toronto Harbour WR-21

Nutrients PL-1, WR-23, WR-27

Nutrients in Great Lakes WR-16

"O"

Odour AR-5

Odour Complaints AR-5

Odourous Pollutants from Restaurants AR-5

Onion Control PL-9

Onion Maggot Control PAC-22

Onions PAC-15, PAC-25

Ontario Apple Marketing Commission PAC-24

Ontario Experimental Neutralization Study WR-9

Ontario Research Foundation AR-20, PL-5, PL-6, WM-2

Oogenesis WR-30, WR-38

Optical Microscope AR-16

Orchards PAC-18

Organic Airborne Particulate Matter AR-18

Organic Carbon Analysis LS-52

Organic Compounds WR-17, WR-28

Organic Contaminants LS-24, LS-73, WR-24

Organic Flocculation LS-39

Organic Pollutants LS-74, LS-77

Organic Vapour Sampling AR-19

Organics PL-3, PL-5, LS-19, LS-80

Organics in Air AR-18

Organics in Bay of Quinte WR-20

Organics in Water PL-12

Organics Removal PL-14

Organisms in Sewage Lagoons PL-18

Organochlorines LS-75

Ottawa PL-7

Overflow Control LS-33

Oxidant Injury to Potatoes AR-6

Ozone AR-1, AR-6, LS-20, LS-21, PL-3

Ozone Effects on Corn and Beans AR-11

"p"

PAC LS-23

Packaging Materials WMAB-3

PAH Loss due to Evaporation and Oxidation AR-18

PAH Standards AR-13

PAH's AR-18

P-A/M-F Cultures LS-17

Paper Mill Effluents WR-18

PAH Standards AR-17
AR-18

Parasites in Onions PAC-22

Particulate Matter AR-18

Particulates AR-17

Pathogenic Bacteria LS-22

PBAC LS-23

PCB's LS-69
LS-75
WR-16
WR-23

PCDDS/PCDFS in Incineration Source Samples LS-76

PEG Hydroextraction LS-39

Penetang-Midland WR-13

Personal Monitors PL-8

Persistence of Pesticides PAC-6

Pest Control PL-9

Pests and Vegetables PAC-15

Pesticide Containers PAC-16

Pesticide Damage to Tomatoes PAC-13

Pesticides PAC-11

Pesticides in Public Areas PAC-6

Pesticides Residues PAC-6

Pesticides in Soil PAC-23

Phenols LS-62

Phosphorus Control WR-16

Phosphorus Regeneration WR-14

Phosphorus Removal LS-2

Phorphorus Removal Studies WR-13

Photodegradation WMAB-3

Physical Processes at Hamilton Harbour WR-27

Phytoplankton WR-15
WR-19
WR-25

Phytotoxicology AR-1
AR-6

Picloran PAC-19

PIXE AR-8

Plaque Assay LS-38

Plume Configuration WR-27

Plume Tracking WR-25

Point Source Discharges WR-28

Polar Pesticides LS-68

Pollutant Sources LS-31

Polycyclic Aromatics Hydrocarbons AR-3

Polychlorinated Dibenzodioxins (PCDD's) AR-20

Polychlorinated Dibenzofurans (PCDF's) AR-20

Polynuclear Aromatic Hydrocarbons AR-7

Port Hope WR-26

Potable Water LS-10
LS-11
LS-12
LS-13
LS-15
LS-16
LS-17
LS-18
LS-20
LS-21
LS-23
LS-66
LS-80

Potatoes AR-6
PAC-15

Potting Soils WM-1

Predators to Control Onion Maggots PAC-22

Priority Pollutants LS-79, LS-81

Probability WR-1

Production of Garbage Gas WM-8

Promoters PL-16

Proton Induced X-Ray AR-8

Public Health PL-4

Public Participation WMAB-2

Publications PL-13

Pulp and Paper Effluents WR-18

Purging Apparatus LS-80

"Q"

Queen's University AR-8, WR-13, WR-15

"R"

Rain Gauge AR-14

Rainbow Trout WR-35

Rainbow Trout, Brook Trout and Lake Trout WR-36

Raw and Treated Water WR-29

Receiving Waters PL-4, LS-22

Recovery Techniques LS-81

Recycling WMAB-1

Refuse Derived Fuel WM-6

Remote Sensing AR-10, WR-6

Remote Sensing Techniques WM-9

Report Compilation PL-13

Report Printing PL-13

Reproduction of Fish WR-30

Resource Recovery WM-6

Rideau River Study LS-29, PL-7

Ridgetown College of Agricultural Technology WM-4

R.M.O.C. PL-7

Road Traffic Noise PL-11

Rodenticides PAC-18

Rootworms PAC-8

Rotenone WR-14

Runoff LS-31

Rutabagas PAC-15

"S"

SAED LS-56

St. Clair River WR-28

Sampling LS-19

Sampling of Aerosols AR-4

Sampling of Asbestos in Air AR-16

Sampling of Nitro PAH's AR-12

Sampling of Waste Incinerators AR-20

Sampling Organic Vapours AR-19

Sandy Aquifers PL-10

Sanitary Landfills PL-10

Sanitary Sewerage LS-30

Satellite Imagery AR-10

Sault College of Applied Arts and Technology PAC-17

Screening WM-6

Secondary Concentration LS-39

Secondary Effluents LS-2, LS-25, LS-27

Sediment Quality Assessment Sediments WR-22, LS-67, WR-20, WR-22

Seed and Cone Insects in White Spruce PAC-9

Seed Bank in Soil PAC-4

Seed for Spruce Trees PAC-9

Seismic Exploration WR-6

SEM LS-56

Sequestration LS-12

Sewage LS-22

Sewage Effluents LS-28, LS-37, LS-41

Sewage Lagoons PL-18

Sewage Sludge WM-4

Sevin PAC-12

Sex Attractant Traps PAC-17

Sheridan Nurseries WM-3

Shredding WM-6

Shrubs WM-3

Simulation Modelling LS-30

Sleep Disturbance PL-11

Sludge Disposal LS-4

Smallmouth Bass WR-32, WR-35

Smut PAC-1

Snow Mold Disease PAC-3

Sodium Borohydride LS-47

Solid Waste WMAB-4

Solvent Extracts LS-81

Source Separation Grant Program WM-5

Southwestern Region PL-1

Soybean PAC-7

Spermatogenesis WR-30, WR-38

Spottail Shiners WR-31

Spray Control on Beans PAC-26

Spruce Budworm PAC-17

Spruce Budworm: Biological Control PAC-10

Spruce Budworm Populations PAC-17

Stack Emissions PL-17

Standard Biological Laboratories PL-15

Stelco LS-45, PL-6

Sterile Male Onion Maggot PL-9

Storm Condition Effects WR-29

Stormwater Detention Ponds LS-32

Stormwater Impoundment WR-12

Stormwater Ponds LS-34

Stormwater Runoff PL-7, LS-29, LS-34

Stratford LS-30

Sturgeon Bay WR-13

Sublethal Effects of Pesticides PAC-11

Sublethal Effects on Fish WR-36

Subsurface Contaminants WR-2

Sulphur Dioxide Emissions PL-17

Sunfish WR-35

Surface Water Quality Management WR-8

Survey of Waste Disposal WM-10

Suspended Particulates PL-6

Suspended Solids LS-52

SWARU Plant in Hamilton AR-20

Sweet Corn AR-11

Swimming Beaches PL-7

"T"

TAGA AR-4

Talc LS-55

Taxonomy WR-15

Taylor Creek LS-31

T.C.G. Materials Ltd., Brantford WM-3

Technology Transfer PL-13

TEM LS-56

Temik(R) PAC-5

Temperature Monitoring, Port Hope Harbour WR-26

Thallium LS-44

Thedford Marsh PAC-22

Thermal Discharge WR-25

Thermal Imagery WM-9

Thiocyanate LS-43

Thrips PAC-14

Tillsonburg Sewage Treatment Plant LS-37

Tobacco PAC-28

Tomatoes PAC-13

Toronto City Health Department WR-29

Toronto Waterfront WR-29

Toronto Waterfront Bioaccumulation WR-24

Toronto Waterfront Circulation WR-21

Toronto Waterfront Sediment Quality Assessment WR-22

Toxicity of Multiple Organics WR-34

Toxicity of Natural Water WR-17

Toxicity of Pesticides PAC-22

Trace Contaminants LS-13

Trace Contaminants, Hamilton Harbour WR-27

Trace Organic Contaminants AR-20

Traffic Noise PL-11

Transmission Electron Microscopy LS-55

Transport of Aerosols AR-10

Tree Rings AR-8

Trend Analysis for Phytoplanktons WR-15

Trends of Nearshore Fish WR-31

Trent University AR-14

Trihalomethanes LS-15, PL-14

Tritium LS-66

True Colour LS-64

Turbidity Plumes WR-29

Turfgrass PAC-3, PAC-6

"U"

Ultrafiltration LS-39

Unit Processes LS-3

University of Guelph AR-1, AR-6, AR-11, PAC-1, PAC-2, PAC-3, PAC-6, PAC-7, PAC-8, PAC-11, PAC-12, PAC-14, PAC-19, PAC-20, PAC-21, PAC-22, PAC-25, PAC-26, PAC-27, PAC-28, PL-9, WM-1, WM-3, WR-13, WR-15, WR-33

University of Toronto AR-4, AR-9, AR-15, PAC-10, PL-8, PL-17

University of Waterloo AR-13, PL-10, WM-10

University of Western Ontario PAC-4, PAC-5, PAC-15, PAC-16, PAC-23, WR-30

University of Windsor AR-5

Uptake Effects WR-28

Urban Drainage PL-7

Urban Lakes WR-12

Urban Road Dust PL-6

Urban Runoffs LS-35

U.S.A. - EPA WM-8

Use of Compost WM-3

UV Disinfection LS-26, LS-37, LS-41, PL-15

UV Irradiation LS-25

"V"

Variability of Insect Pests PAC-24

Vegetable Crops PAC-15, PAC-21

Viruses LS-37

Vitamin Loss WMAB-3

Volatilization of Organic Pollutants AR-9

"W"

Waste Disposal Site WM-9

Waste Incinerator Plants AR-20

Waste Incinerators AR-20

Waste Management WM-6

Waste Management Assessment Study WM-9

Waste Paper WM-2

Waste Reduction WMAB-4

Wastewater Treatment Plants LS-26

Water Distribution Systems LS-18

Water Management WR-7

Water Quality WR-21
WR-25
WR-29

Water Quality Computer Programming WR-8

Water Quality Criteria WR-8

Water Quality Flagging WR-8

Water Quality in Bay of Quinte WR-20

Water Quality in Hamilton Harbour WR-27

Water Quality Network WR-3

Water Resources Inventory WR-7

Water Samples LS-79

Water Treatment LS-19
LS-23

Waterborne Mutagens PL-16

Watford Landfill Site PAC-16

Weather-timed Fungicide Schemes PAC-21

Weed Control Application PAC-2

Weed Infestation Prediction PAC-4

Weed Monitoring PAC-7

Wetlands WR-11

White Mold PAC-26

White Spruce PAC-9

Wilson, S.S. & Associates PL-11

WPCP LS-3
LS-25
LS-36

WPCP Effluents PL-15

WPCP Effluents Flowing into Marsh WR-11

"X"

X-Ray Emission AR-8

X-Ray Fluorescence LS-56

"Y"

Yellow Perch WR-32

Yersinia Enterocolitica LS-17

York University AR-3
AR-7
AR-10
PL-16
PL-20

"Z"

Zebra Fish WR-33

Zenon Environmental Enterprises Ltd. LS-23
PL-14

Zeolites LS-56

Zooplankton PAC-11

Zooplankton Studies WR-25

POOR

QUALITY

ORIGINAL